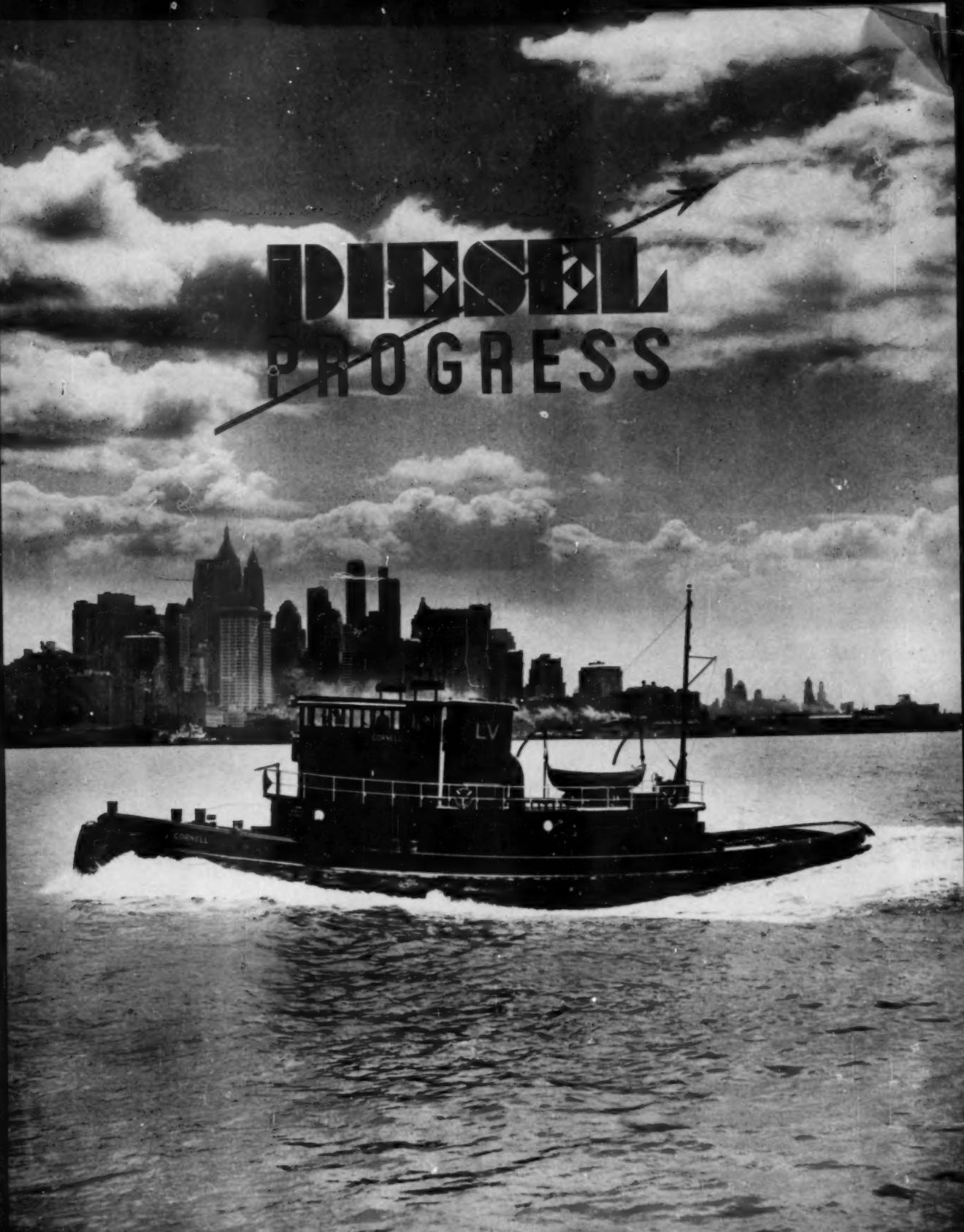


IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

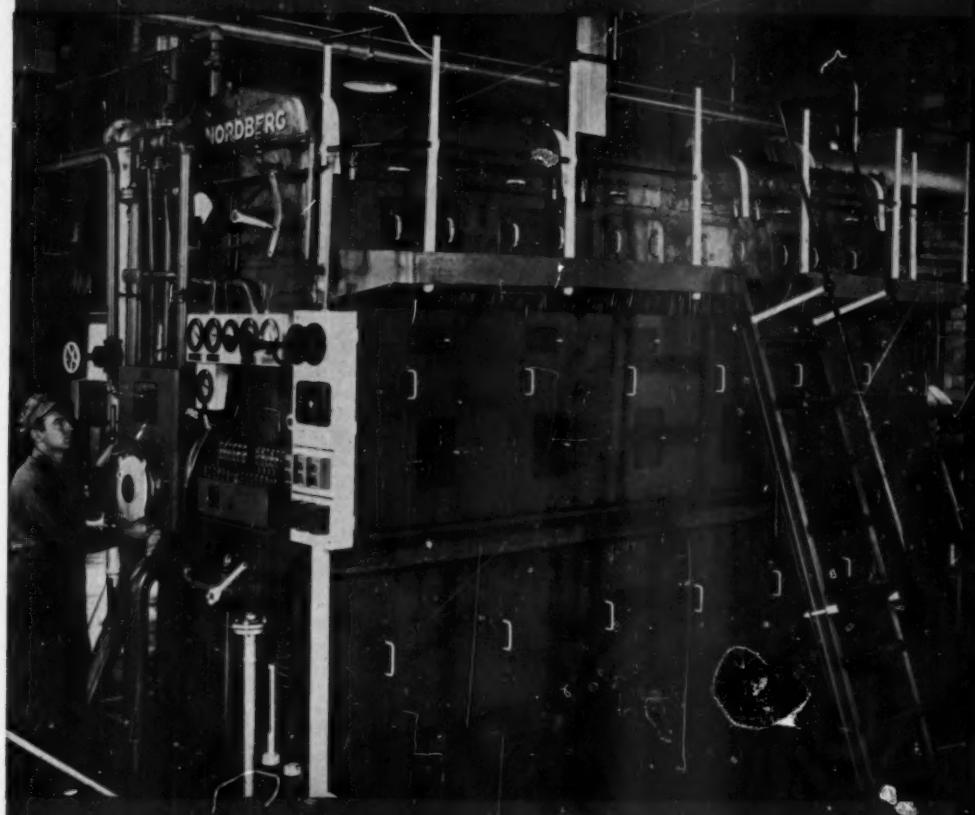
# EDISON PROGRESS



FIVE DOLLARS PER YEAR

FIFTY CENTS PER COPY

# A record of **LOW**



Madison, Wisconsin, Municipal Power  
District. This enormous Diesel engine is  
a four-cylinder, cross-below, supercharged  
unit driving an 875 kw direct generator.  
Natural gas is burned except during

periods of emergency when the one  
operating unit fails.

One of Texaco's four lubricants  
has played an important part in making  
power costs so low.

1951 © Texaco Inc.

TUNE IN ...  
TEXACO STAR THEATER  
starring  
MILTON BERLE  
on television  
every Tuesday night.  
METROPOLITAN OPERA  
radio broadcast every  
Saturday afternoon.



# TEXACO

# MAINTENANCE COSTS

**TEXACO  
URSA OIL produced  
3 savings in this  
gas-burning Diesel**

**MR. A. J. WOLFF**, Superintendent of the Elkhorn (Wisc.) Light and Water Commission, reports the following cost-saving results from lubricating with *Texaco Ursa Oil*:

1. Clean operation—minimizing wear and assuring lower maintenance costs, longer engine life.
2. Long oil service life.
3. Low lube oil consumption—4301 kw-hrs per gallon.

Low maintenance costs are an old story to operators using *Texaco Ursa Oils* to lubricate Diesel, gas or dual-fuel engines. These world-famous oils have top resistance to oxidation . . . keep engines free from harmful sludge and car-

bon . . . assure free rings for proper compression and perfect combustion. Lower fuel consumption goes along with lower maintenance costs.

*Texaco Ursa Oils* are approved by leading engine builders and preferred by operators everywhere. In the Diesel field, for example—

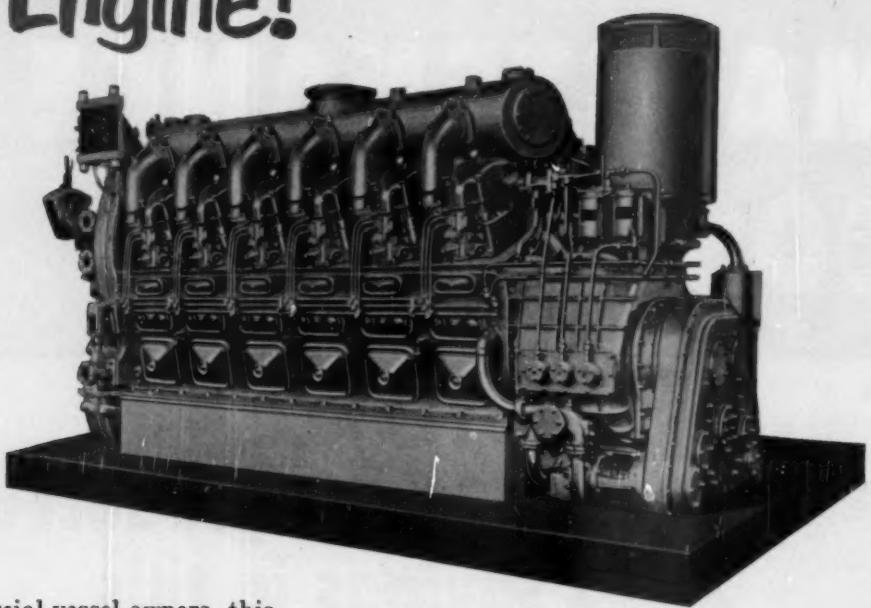
*More stationary Diesel h.p. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.*

Let a Texaco Lubrication Engineer help you gain more efficient, more economical engine operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

## **URSA OILS**

**FOR ALL DIESEL, GAS  
AND DUAL-FUEL ENGINES**

# America's finest marine Diesel Engine!



TO MOST commercial vessel owners, this General Motors Model 278A Diesel is known as the finest marine engine used in America's modern work boats.

THE U. S. NAVY and commercial vessel owners have found this engine dependable. They can't afford to be wrong.

See this engine at our exhibit at the

*New York Motorboat Show*

January 12-20



ENGINES FROM  
150 TO 2000 H. P.

Leader in Diesel engineering development for 39 years

## Cleveland Diesel Engine Division

CLEVELAND 11, OHIO

GENERAL MOTORS

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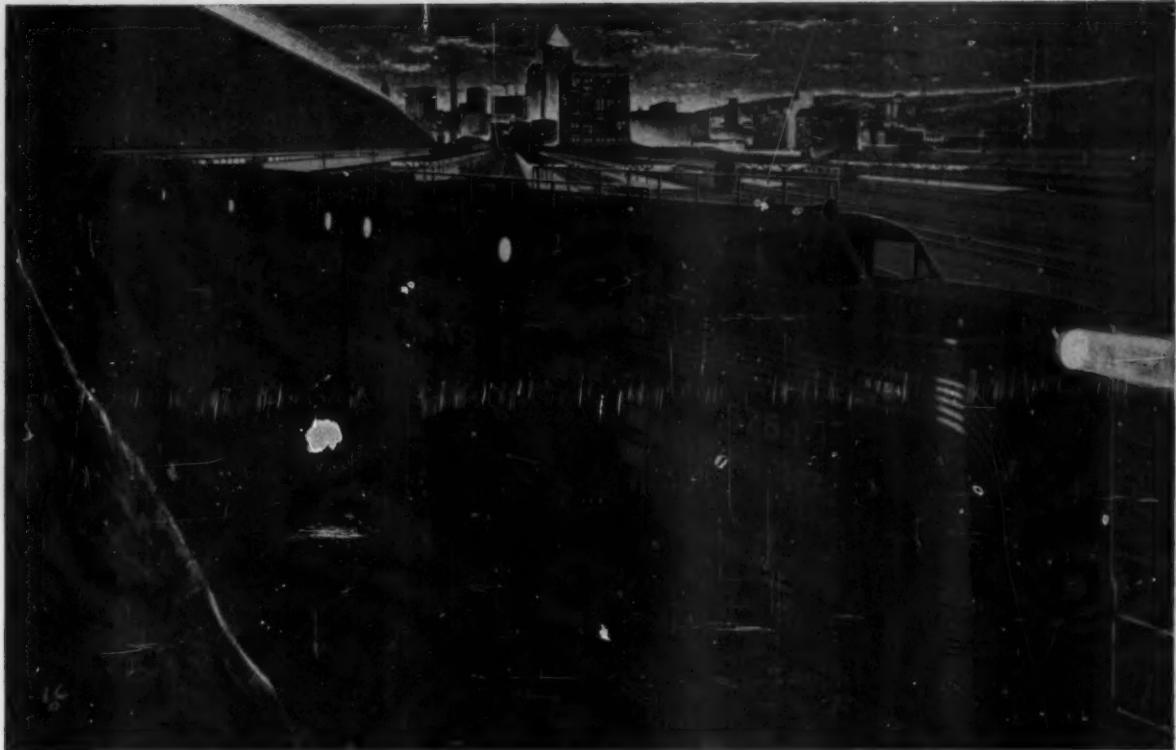
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Toronto, Ontario

*the trend is to Diesels — and to*  
**GULF DIESELMOTIVE OIL**



THE PITTSBURGER, crack train of the Pennsylvania Railroad, leaving the Pennsylvania Station in Pittsburgh on its nightly run to New York City.

As recently as January 1949, there were only about 5,600 Diesel locomotives in service on U. S. railroads. Today the figure is over 10,000! And new Diesels are being placed in railway service just as quickly as the manufacturers can produce them.

More and more of these fast and powerful units get the right start for a long life and low maintenance costs with a crankcase fill of Gulf Dieselmotive Oil. Many of the Diesel locomotives for the crack trains of the Pennsylvania Railroad, for example, are lubricated with Gulf Dieselmotive.

This outstanding oil keeps Diesel engines clean, prevents bearing corrosion, foaming, and excessive wear.

Gulf Dieselmotive Oil is one of a family of outstanding Diesel lubricating oils which includes Gulfpride-Diesel and Gulflube Motor Oil H.D. for automotive Diesel engines; Gulf Parvis Oil and Gulf Universal Oil for stationary and marine Diesel engines.

For further information on Gulf Diesel lubricating oils and for practical help on any Diesel lubrication or maintenance problem, call in a Gulf Lubrication Engineer.

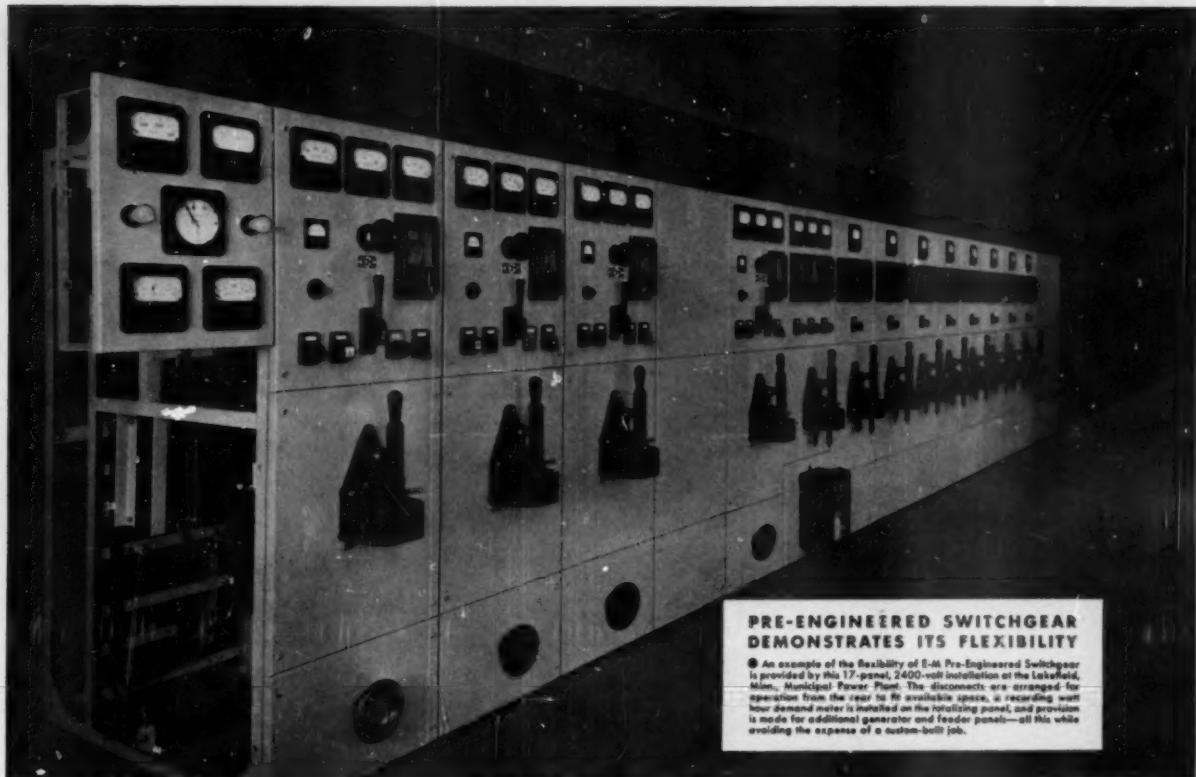
**Gulf Oil Corporation • Gulf Refining Company**

GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses

Located in principal cities and towns throughout  
Gulf's marketing territory





## All the Advantages of Custom-Built Generator Switchgear without the Extra Cost!

THESE are several ways to obtain switchgear. You can go to the greater cost of having one custom-built.

You can select ready-made inflexible stock units that do not precisely meet all the individual requirements of your installation.

And the third way, the most satisfactory way, is to select a time-tested and field-proved E-M Pre-Engineered Switchgear.

For E-M Switchgear gives all these advantages . . . all components are pre-engineered and coordinated with each other. The gear is designed to provide switching protection for equipment and operators, metering, voltage regulation and for

synchronizing generators. It is dead-front as our minimum and can be fully enclosed for even greater safety.

In addition E-M design provides a flexibility that permits additional meters or controls to meet peculiar needs.

This easy-to-buy, pre-engineered switchgear is a profitable, wise, modern choice. For full information, talk with your nearest E-M field engineer or write for specifications, panel outlines, and line diagrams of connections of basic units in Publication 194.

**ELECTRIC MACHINERY MFG. COMPANY**  
MINNEAPOLIS 13, MINNESOTA

4200-YPA-206



**SPECIALISTS IN GENERATOR  
AND SWITCHGEAR ENGINEERING**

DIESEL PROGRESS

# "For Cleaner Over-all Combustion in Diesel Engines..."\*\*

Writes Jean Santschi  
Outstanding Diesel Authority



\*

"I have seen many developments in the Diesel field since the days when I worked with Dr. Rudolph Diesel. One of these developments which is worthy of every engineer's attention is Lubaid-D. Results are excellent!"

Results from the continued correct use of this product have shown that Lubaid-D aids materially in achieving cleaner overall combustion in Diesel engines which reflects itself in reduced carbon formations that interfere with the operation of rings, valves, and ports. This means lower overall maintenance costs and shorter outages."

*John Santschi*



## LUBAID-D

An additive for diesel fuels that aids in better, lower-cost performance

**AIDS** in dispersing gum, sludge and varnish

**AIDS** in achieving free pumping

**AIDS** in maintaining maximum compression pressures

**AIDS** in achieving cleaner combustion

**AIDS** in reduction of port clogging and sticking valves

### LUBAID COMPANY

MILWAUKEE, WISCONSIN

EASTERN SALES OFFICE . . . 149 BROADWAY, NEW YORK CITY





## Reduce Engine Exhaust and Compressor Intake Noise—with **BURGESS-MANNING SNUBBERS**

In every field of industrial activity where noise, gas surging, or harmful engine or compressor vibration cannot be tolerated, you will find Burgess-Manning Snubbers. Snubbers prevent noise by smoothing the intake air and dissipating the energy in the exhaust gas slugs, providing quiet operation without affecting performance. Write Burgess-Manning, today, for information.

**BURGESS-MANNING COMPANY • LIBERTYVILLE, ILLINOIS**

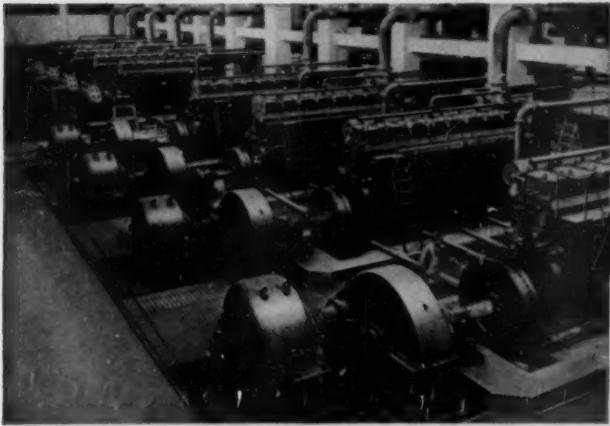


**SNUB THE  
SLUG AND  
STOP THE NOISE**

**For Quiet  
Telephoning . . .  
Burgess-Manning  
ACOUSTI-BOOTH**  
Thick walls of sound-absorbing material soak up noise. You can hear easily . . . talk comfortably in noisy surroundings. Suited to any location. Modern in appearance. Wall and floor models. Doorless.

# EXCEPTIONAL LOW POWER COST

for huge new Los Angeles sewage disposal plant



Nine Supercharged, Dual Fuel Worthington Engines, of 1688 hp each, installed at the new Hyperion Sewage Treatment Plant, Los Angeles, California

Now being built at a cost of approximately \$41 million, Los Angeles' new Hyperion sewage disposal plant will be the most modern and efficient in the world. Designed to handle an average daily flow of 245 million gallons of raw sewage, this modern "high-rate" plant will feature the most advanced engineering in every detail of operation.

Nine Worthington Dual Fuel engines are to be the entire power source. Five will drive generators, and the other four will drive blowers. The Hyperion plant will operate at exceptionally low cost, thanks to: (1) the Worthington-pioneered dual fuel principle, permitting the use of gas, oil, or gas and oil in any ratio; (2) supercharging, which provides maximum power for available space, and with the utilization of high-

temperature water cooling and exhaust heat recovery system, results in highest thermal efficiency.

#### SEWAGE GAS THE FUEL

These Worthington engines will normally run on raw sewage gas, utilizing pilot oil to ignite the gas. *Fuel expenses under ordinary conditions, therefore, will be only the cost of pilot oil.* However, should there ever be a shortage of sewage gas, the engines will automatically shift to oil fuel, in the necessary ratio. This gas-oil ratio can also be



Worthington  
Supercharged  
Dual Fuel Engines  
to Supply 15,000 hp  
... for only the  
cost of pilot fuel!

controlled manually.

#### FOR EVERY SIZE OF PLANT

In addition to Dual Fuel Engines, Worthington makes a wide range of Diesels, pumps, compressors, and other equipment, to meet the requirements of sewage treatment plants of every size from the smallest to the largest. For further facts on the trouble-free, cost-saving engine performance that proves *there's more work in Worthington*, write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.*

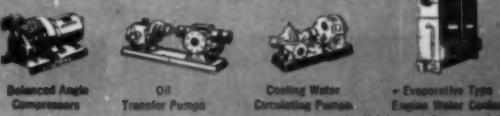
# WORTHINGTON

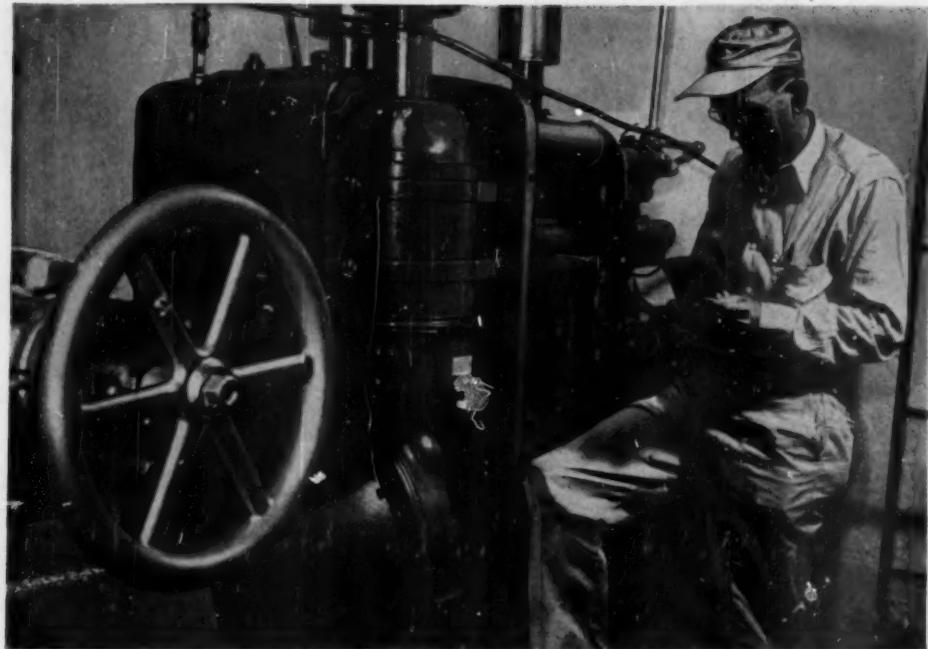


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#### WORTHINGTON-BUILT AUXILIARIES

Diesel engines, 150 to 3,520 hp... gas engines, 175 to 3,520 hp... dual fuel engines, 225 to 3,290 hp.





Saved City's Life: This International UD18-A took over single-handed when main water works pump motor failed.

# "SOME PUMPIN'"

## says Pompano of UD 18-A

Down in Pompano Beach, Florida, an International UD18-A Diesel was put in the pumping station on a stand-by basis. Eight weeks later the main motor and switch burned out, and the International took over. Running steadily and alone, it supplied 850,000 gallons of water a day to 12,000 people. "It not only saved MY life," says Water Superintendent Smith, "it saved the city's, too!"

Other International diesel and gasoline power units help put

the "work" in public works in thousands of communities, in dozens of ways. They're equal to emergencies, ready for steady service day in, day out. They're yours in eleven sizes, up to 180 working h.p. Your International Industrial Distributor or Power Unit Dealer has the whole story. See him now—and plan to make your budget for power go further with "Power that Pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

INTERNATIONAL

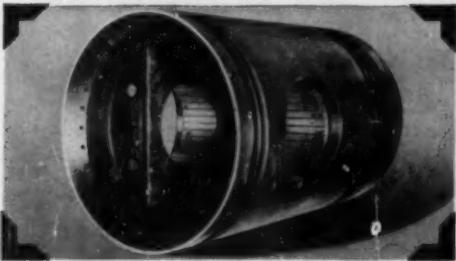


POWER THAT PAYS

# STANDARD ENGINEER'S REPORT

DATA	
LUBRICANT	RPM DELO Oil R.R.
UNIT	Diesel Locomotive cylinder assembly
SERVICE	Mountain Freight
LOCATION	Transcontinental freight service on Moffat Tunnel + Royal Gorge Routes
PERIOD	In excess of 8 years
FIRM	Denver & Rio Grande Western R.R.

One million miles of service on cylinder liners and pistons



IN SERVICE APPROXIMATELY 1,000,000 MILES in Denver & Rio Grande Western Railroad diesel locomotive engines, this piston and cylinder liner were always lubricated with RPM DELO Oil R.R. At the end of that time wear



measurements (inches) were only: Piston Skirt—0.001; Ring Grooves—No. 1—0.003 to 0.006, No. 2—0.002, No. 3 & 4—none; Cylinder liner (maximum diameter)—0.0095, (out of round)—0.002 to 0.004.



RPM DELO Oil R.R. has been the standard on the Denver & Rio Grande Western Railroad for over-the-road freight and passenger locomotives since their first power of the type was placed in service in January 1942. At the time this inspection was made approximately 49,563,104 miles had been traversed by the Rio Grande freight diesel fleet of 100 units and during that period only 77 cylinder liners had been scrapped for any reason. At that time many of the original pistons and cylinder liners were still in service and the average age of all these assemblies, including recently purchased power, was 4.7 years.

TRADEMARK "RPM" REG. U.S. PAT. OFF.

## How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



- A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.
- C. Special compounds stop corrosion of any bushings or bearing metals and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.



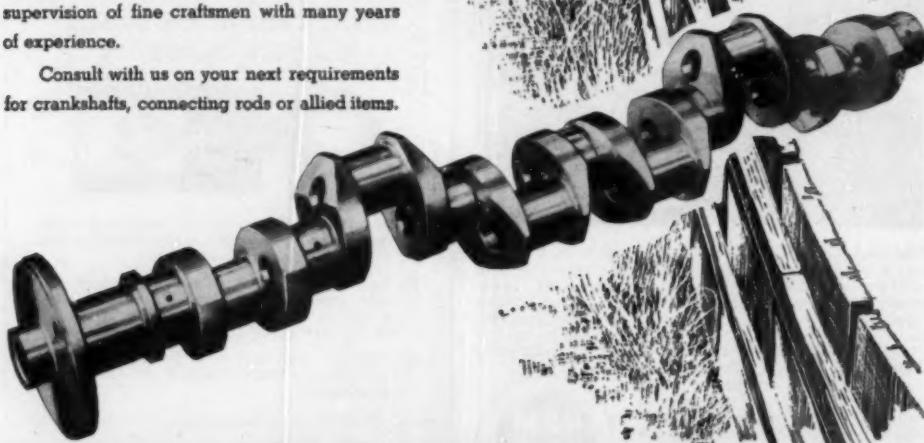
STANDARD OIL COMPANY OF CALIFORNIA • San Francisco  
THE CALIFORNIA OIL COMPANY • Berlin, N.J. • Chicago, N.Y. • Detroit

STANDARD OIL COMPANY OF TEXAS • El Paso, Texas  
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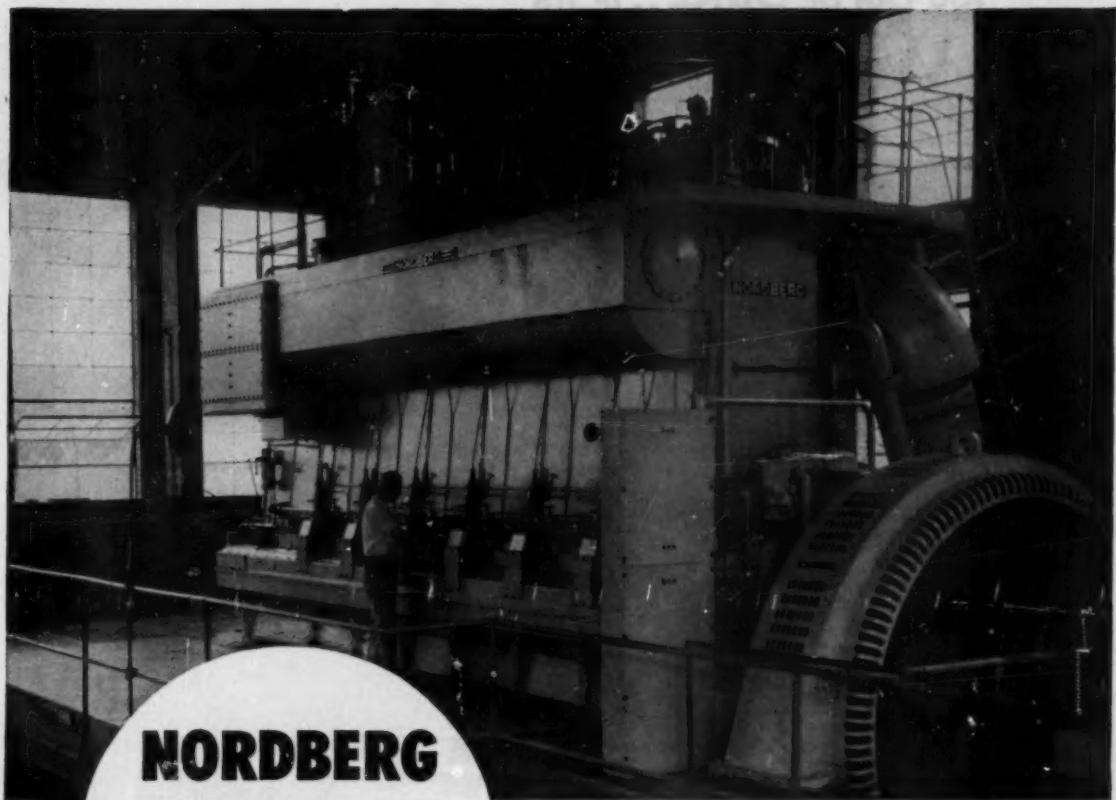
**One Control....  
One Responsibility**

THE final result of this youngster's activity is entirely dependent upon his ability. He stands or falls on his own. That's the way we here at Erie Forge approach your problem—we take it over completely—One Control—One Responsibility. Every step—from raw material to finished crank is accomplished here. Design, metallurgical control, casting, heat treating, forging and machining are under the constant watchful supervision of fine craftsmen with many years of experience.

Consult with us on your next requirements for crankshafts, connecting rods or allied items.



**ERIE FORGE COMPANY, ERIE, PA.**



**NORDBERG**  
**DIESEL** saves  
**\$100,000**  
*a year!*

HARRISONBURG, VIRGINIA, CUTS  
GENERATING COSTS IN DIESEL-  
STEAM-HYDRO SYSTEM WITH  
2400 H.P. DIESEL BURNING  
ECONOMICAL NO. 5 FUEL

FROM 1904 to 1923, the city of Harrisonburg, Va., relied on hydro electric power entirely. In 1923, a new steam plant was put in operation to meet the city's growing power requirements. In 1949, a 2400 h.p. Nordberg Diesel was installed to handle the rapidly expanding load and to reduce power generating costs.

This Nordberg two-cycle unit, driving a 1690 kw generator, is saving Harrisonburg \$100,000 a year as compared with steam generating costs, and has become the major power producer in the city's diesel-steam-hydro system. The Diesel is operating 24 hours a day and producing at the rate of 10,000,000 kw. hrs. a year. Burning an economical No. 5 fuel oil, its record has been so impressive that the city council has voted to expand the Diesel plant and abandon steam as a regular source of power.

Here, then, is an outstanding case study of the way in which Nordberg Diesels can cut power costs. Write for further information on Nordberg two and four-cycle oil burning and Duafuel Diesels and gas burning engines to meet your specific power needs . . . sizes from 10 to 9600 h.p.

**NORDBERG MFG. CO., Milwaukee 7, Wis.**

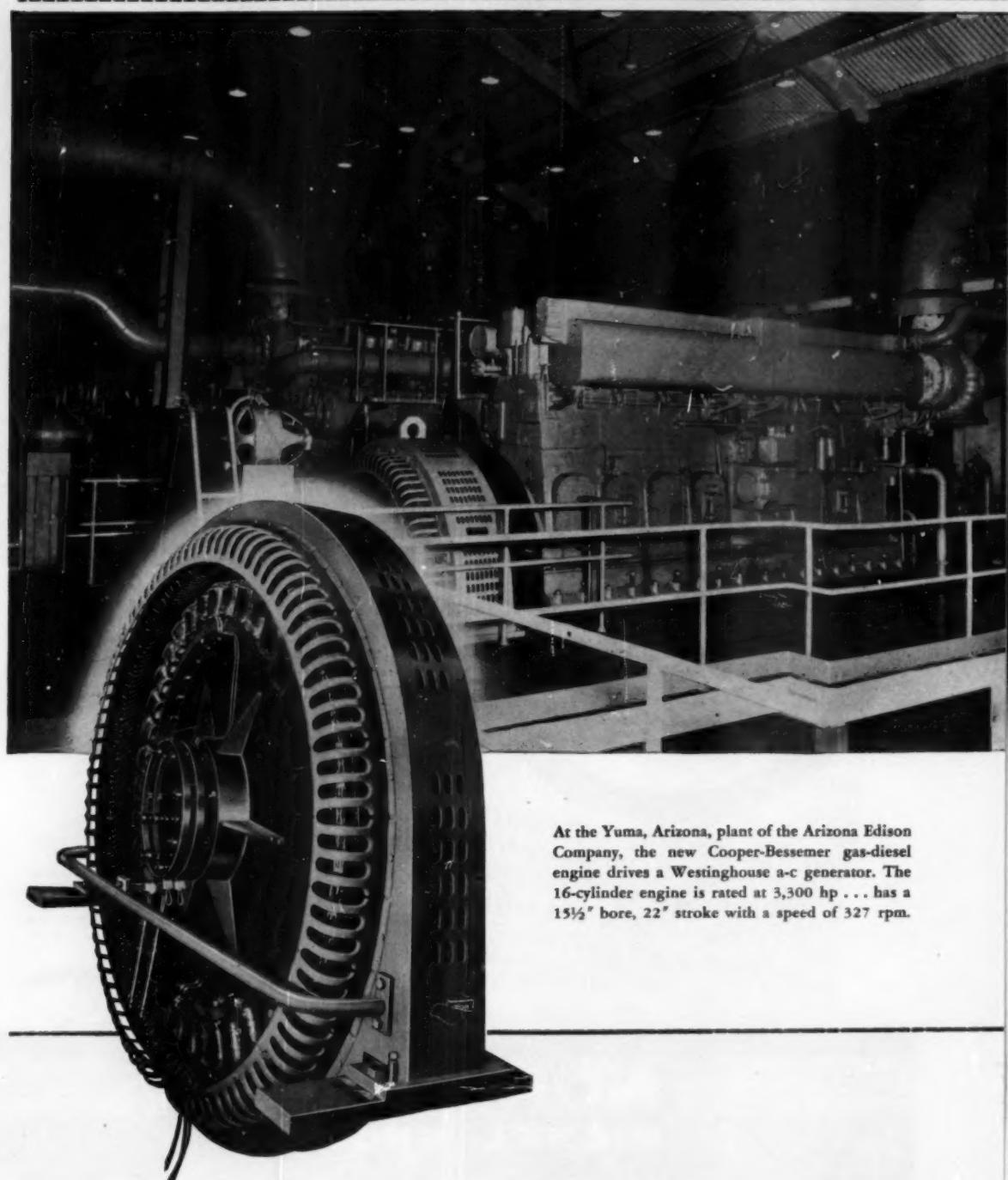
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**BUSCH-SULZER**  
A DIVISION OF NORDBERG

**NORDBERG**  
**DIESEL ENGINES**



YOU CAN BE **SURE**... IF IT'S  
**Westinghouse**



At the Yuma, Arizona, plant of the Arizona Edison Company, the new Cooper-Bessemer gas-diesel engine drives a Westinghouse a-c generator. The 16-cylinder engine is rated at 3,300 hp . . . has a 15½" bore, 22" stroke with a speed of 327 rpm.



# *A Working Partner*

## **FOR FULL-TIME, FULL-LOAD RESPONSIBILITY**

It takes two to make a "power" bargain. Consequently, when the diesel builder was called on to provide a complete power unit, he chose an electrical partner that could match the full-load, around-the-clock performance of his 16-cylinder, gas diesel engine.

That's why you see a Westinghouse a-c generator coupled to the diesel. It has the inherent "sureness" of many years of practical experience of Westinghouse in design and construction of various types of alternators.

Every Westinghouse a-c generator is matched to the engine for lifetime operation. Each is built in the most modern and permanent form of construction—structural steel, fabricated with the electric arc.

For example: the fabricated steel rotors have a flexibility factor of practically zero and a maximum strength far in excess of that

required to withstand the inherent pulsating torques of the engine drives. In fact, the rotors have been designed with such a high factor of safety, they are practically unbreakable.

Today, many diesel engines of every leading diesel manufacturer are driving Westinghouse a-c generators. There is no safer way to assure lifetime satisfaction for your power plant than by specifying—"generator by Westinghouse".

Yes, you can be sure . . . of matched performance . . . of special engineering assistance . . . of adequate service facilities—if it's Westinghouse. Consult your nearby Westinghouse office for the services of a Power Apparatus Specialist. He will gladly assist you in planning power generation or distribution equipment. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-21586



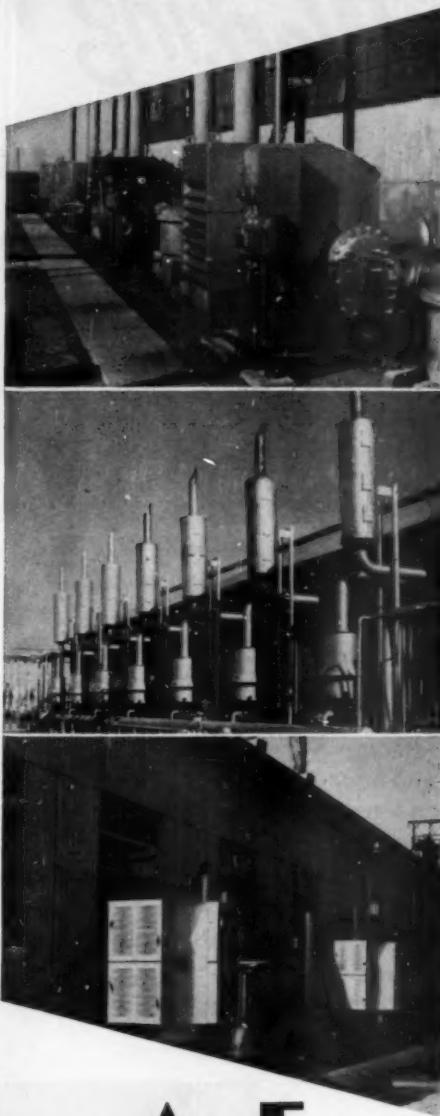
**DIESEL ENGINE DRIVEN  
AC GENERATORS**

# A TRIO OF TROUBLE SHOOTERS!

**There's a unit in AAF's  
family of filters to  
solve every dust problem**

## **1. MULTI-DUTY TYPE CMS**

An automatic air filter designed to handle heavy dust loads. Constant, high efficiency self-cleaning, under any load, assures uniform air delivery and low operating resistance. Maintenance consists of occasional sludge removal which is accomplished without shutting down the filter. For outdoor installation, as shown at right, filter is supplied with housing consisting of weather louvres for protection of the filter curtain and a plenum chamber to which engine or compressor intakes are attached. Ask for Bulletin No. 150.



## **2. CYCOIL AIR CLEANER**

This oil bath air cleaner is a "dust bowl" veteran designed for heavy duty service. Regardless of load, the Cyccoil operates at approximately 100% efficiency in dust removal. The reason—dirty air is first mixed thoroughly with oil and when the two are later separated by centrifugal action over 90% of the total dust content of the air is thrown out with the oil. The remaining dust in the air is then removed by the double filter cells at top of unit. Ask for Bulletin No. 130.

## **3. TYPE "OC-H" FILTERS**

These viscous impingement filters are recommended for the protection of engines and compressors operating in industrial districts where the dust to be removed consists of street dust, coke breeze, soot, etc. Advantages of these washable unit-type filters are (1) low resistance to air flow; (2) high cleaning efficiency; (3) large dust-holding capacity; (4) low first cost; and (5) long life. Type "OC-H" filters are complete assemblies consisting of individual unit filters and housing. For outside installation, as shown at right, faces of filters are protected by easily removed weather louvres. Ask for Bulletin No. 120.

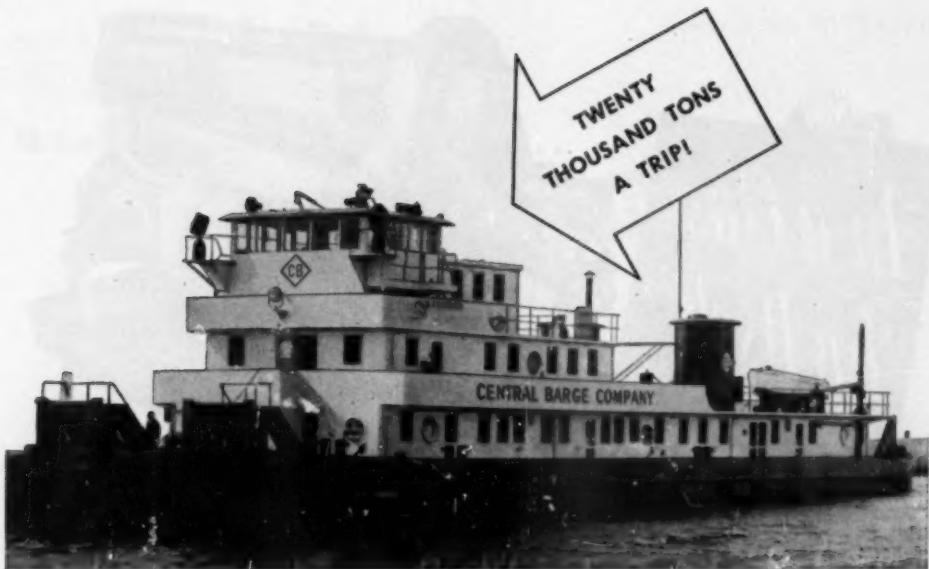
Write today for bulletins on any or all of these engine and compressor filters. And remember—experienced AAF engineers are available to consult with you on special dust problems at any time.



## **American Air Filter**

COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • Darling Bros., Ltd., Montreal, P.Q.



## CENTRAL BARGE COMPANY USES

Operating on the upper Mississippi the M/V A. M. THOMPSON of the Central Barge Company—powered by two Enterprise 8-cylinder, supercharged diesels, is doing a big job and doing it well. On each trip into the Twin Cities and the surrounding area this vessel tows from 12 to 15 barges containing 18,000 to 20,000 tons of coal—the equivalent of 350 to 400 carloads. As in many another marine job where dependable service is essential, Bendix is the choice for fuel injection equipment. In fact wherever big jobs are being done, you'll find Bendix fuel injection equipment playing its part in keeping diesel power at peak efficiency.

# BENDIX

## FUEL

## INJECTION

## EQUIPMENT

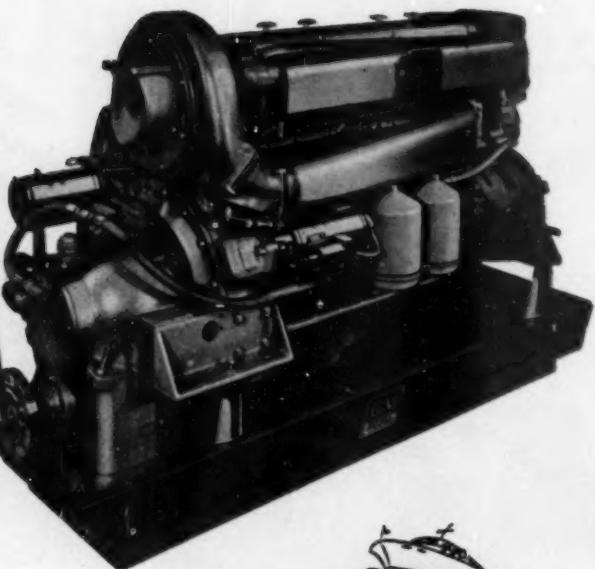


SCINTILLA MAGNETO DIVISION of  
SIDNEY, NEW YORK



Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N.Y.  
Western Market Office: 582 Market Street, San Francisco 4, Calif.

*In a Class  
by Itself*



**GENERAL MOTORS' NEW  
MARINE DIESEL ENGINE—THE 6-110**

HERE'S the newest member of the General Motors Diesel family—the brawny 6-110 engine that develops 275 horsepower.

It is 50% more powerful than the famous 6-cylinder GM "71" engine that powers so many of America's fine yachts, tugs and fishing vessels—yet it weighs less than 15 pounds per horsepower, including the famous GM hydraulic reverse gear.

Like all other GM Diesel engines, the 6-110 is two-cycle and delivers power on every piston downstroke. Advanced design cuts down size without sacrificing ruggedness; it insures fuel economy, lower maintenance costs, exceptional dependability and long life.

The GM 6-110 engine provides Diesel power at its best for a wider range of propulsion and auxiliary applications in work and pleasure boats. It is an exceptionally *compact* Diesel for its horsepower—

a powerful engine that gives remarkably fine performance in minimum space.

See the GM "110" Marine Diesel at the National Motorboat Show in New York City, January 12th to 20th—or at your GM Diesel dealer. See it and we believe you'll agree "it's in a class by itself."

**ONLY GM DIESELS PROVIDE  
ALL THESE ADVANTAGES**

Compact size • Less weight per horsepower • Two-cycle smoothness • Power on every downstroke  
Quick starting on its own fuel • Unit injectors •  
No high-pressure fuel lines • Rapid acceleration  
Cleaner burning • Easy accessibility • GM hydraulic  
reverse gear • Unmatched maneuverability

**DETROIT DIESEL ENGINE DIVISION**

SINGLE ENGINES ... Up to 275 H. P.    DETROIT 28, MICHIGAN    MULTIPLE UNITS ... Up to 800 H. P.  
GENERAL MOTORS

**DIESEL BRAWN WITHOUT THE BULK**



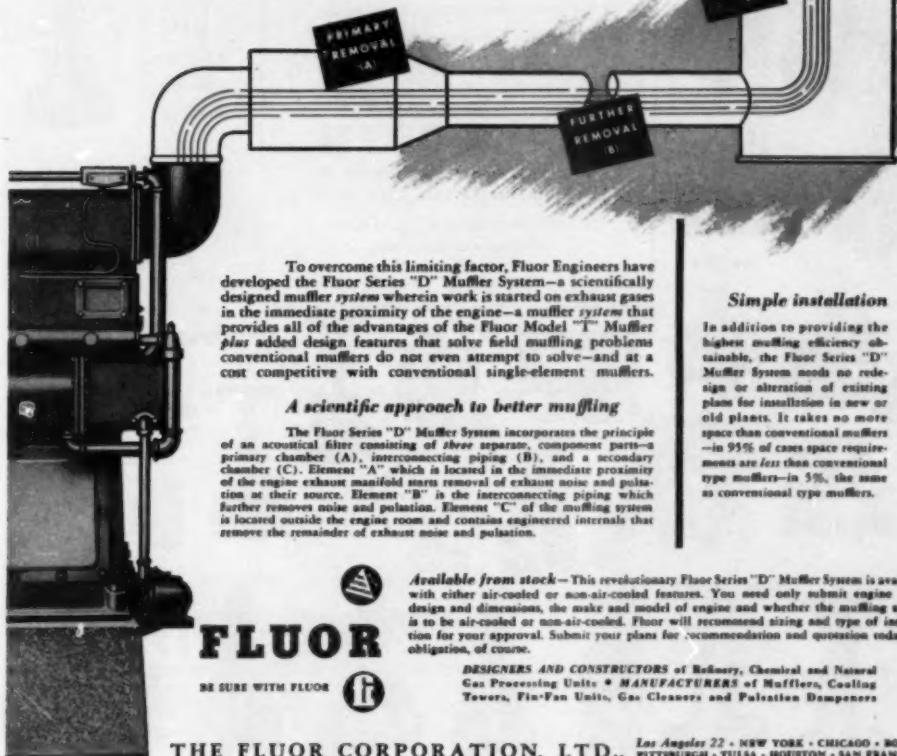
fluor-facts about MUFFLING

**When specifying, consider...**

**MUFFLER SYSTEM**

**The highest muffling efficiency obtainable**

It is a known fact that in conventional muffler installations noise and vibration are reflected *back* through interconnecting piping into the engine room. This fact alone has limited the ultimate noise and pulsation reduction efficiency of 2- and 4-cycle gas and diesel muffler installations.



To overcome this limiting factor, Fluor Engineers have developed the Fluor Series "D" Muffler System—a scientifically designed muffler system wherein work is started on exhaust gases in the immediate proximity of the engine—a muffler system that provides all of the advantages of the Fluor Model "T" Muffler *plus* added design features that solve field muffling problems conventional mufflers do not even attempt to solve—and at a cost competitive with conventional single-element mufflers.

**A scientific approach to better muffling**

The Fluor Series "D" Muffler System incorporates the principle of an acoustical filter consisting of three separate, component parts—a primary chamber (A), interconnecting piping (B), and a secondary chamber (C). Element "A" which is located in the immediate proximity of the engine exhaust manifold starts removal of exhaust noise and pulsation at their source. Element "B" is the interconnecting piping which further removes noise and pulsation. Element "C" of the muffling system is located outside the engine room and contains engineered internals that remove the remainder of exhaust noise and pulsation.

**Simple installation**

In addition to providing the highest muffling efficiency obtainable, the Fluor Series "D" Muffler System needs no redesign or alteration of existing piping for installation in new or old plants. It takes no more space than conventional mufflers—in 95% of cases space requirements are less than conventional type mufflers—in 5%, the same as conventional type mufflers.

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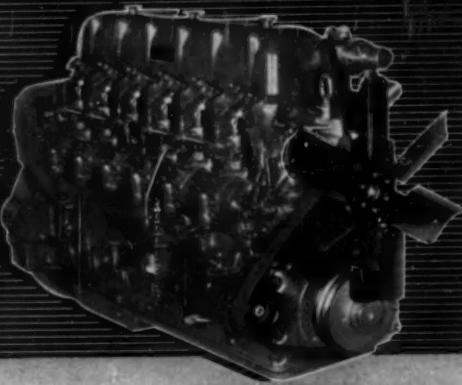
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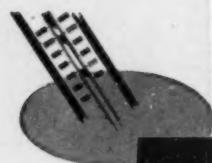
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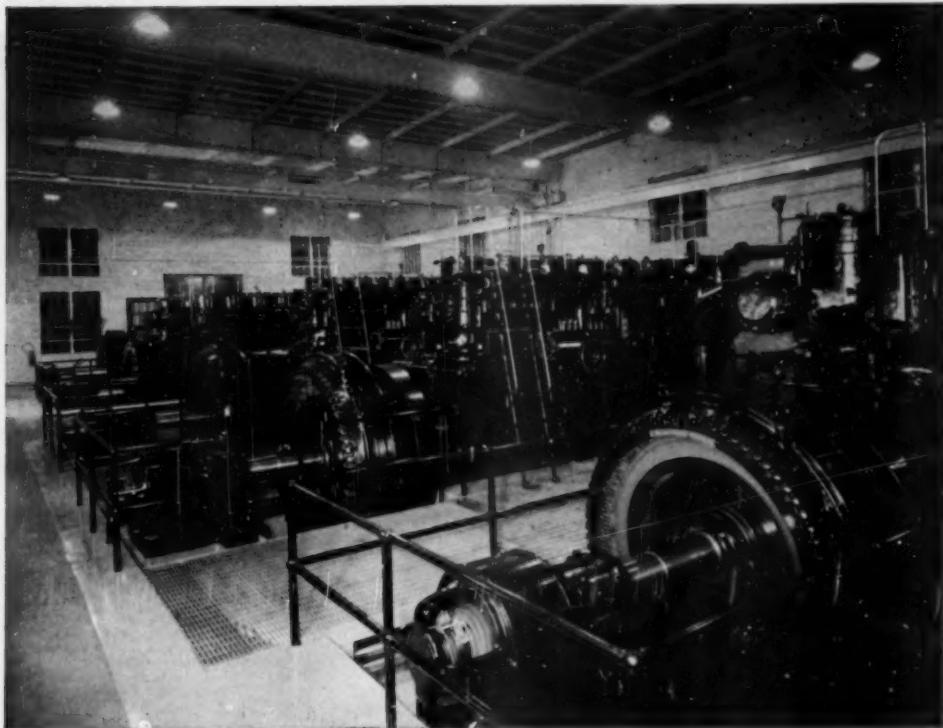
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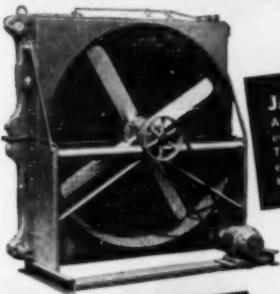
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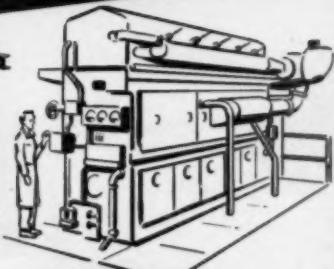
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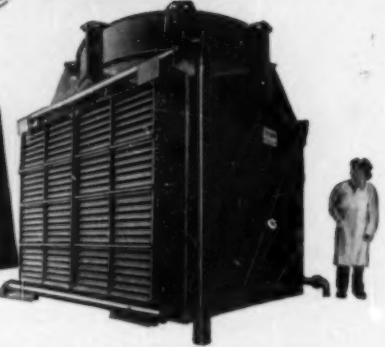
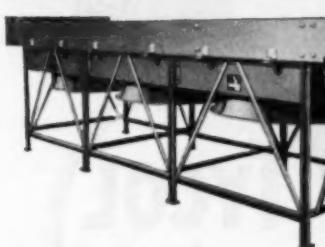
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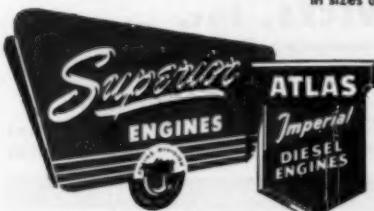
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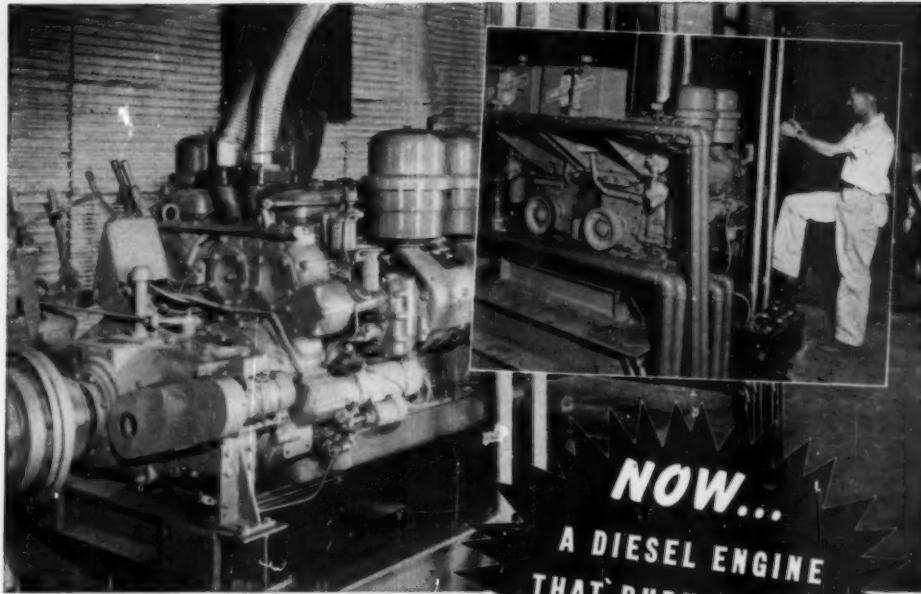


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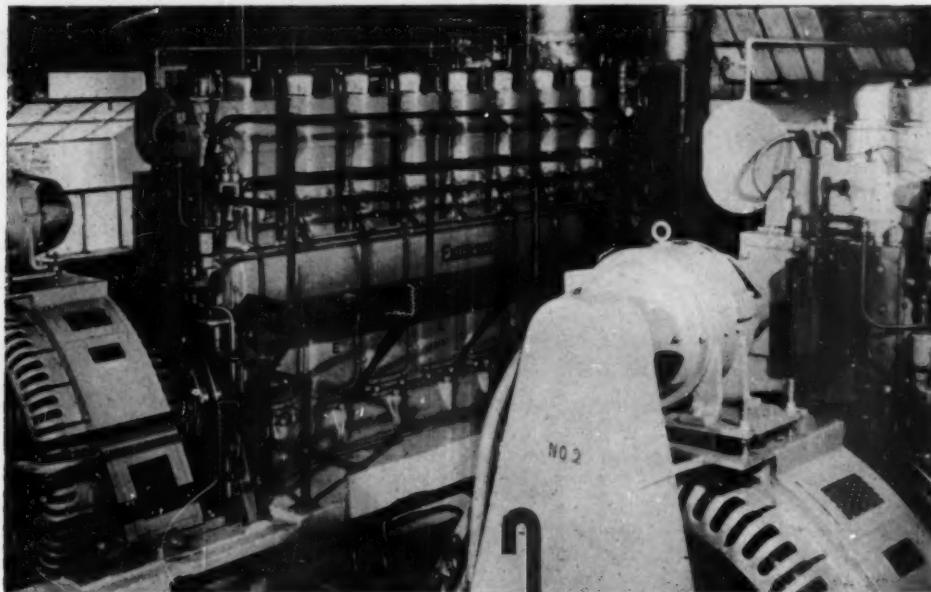


## CONTENTS FOR JANUARY, 1951

Logging With Diesels	29
A Dieselized Caboose	33
Rensselaer, Indiana	34
Diesel Dredge in Nigeria	38
Diesels Help Irrigation	40
Pipe Line Diesels	42
Lindsborg, Kansas	44
Twin Steel Diesel Shrimpers	47
Muffler Types	48
Large Portable Diesel Sets	50
Exchange Your Diesel Maintenance Ideas	52
Diesel Powered Mondeo	53
What's Going On in England	54
Diesel Plant in Isfahan, Persia	56
Eastern Washington Diesel Trucks	84

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Subscriptions may be paid the London office at 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# \$33,526 PROFIT\*



...Leads to Purchase of

3rd ENTERPRISE  
DIESEL

Positive proof of engine performance often lies in the profit picture. That's where the investment in new equipment pays off—or doesn't. At McLeansboro, Ill., where two of their three new Enterprise Diesels are now in operation, the proof is there: \*the city's profit for the last fiscal year reached \$33,526—including four months operating the old turbine generator system at a loss! And with the installation of a third Enterprise Diesel, purchased as a result of the high operating performance of the first two, city officials predict the annual profit will jump to more than \$38,000. The city of McLeansboro is now assured of 1) a reduction in electric rates, 2) sufficient and dependable power to take care of future growth and development, and 3) a modern power plant that is quickly paying for itself.

The story at McLeansboro is not uncommon where Enterprise Diesels have been put to work. Scores of these efficient units, serving the needs of progressive cities everywhere,

daily demonstrate the fact that both power-wise and profit-wise, Enterprise is first in the field. *Enterprise Engine & Machinery Co. A Subsidiary of General Metals Corporation, 18th & Florida St., San Francisco 10, Calif.*

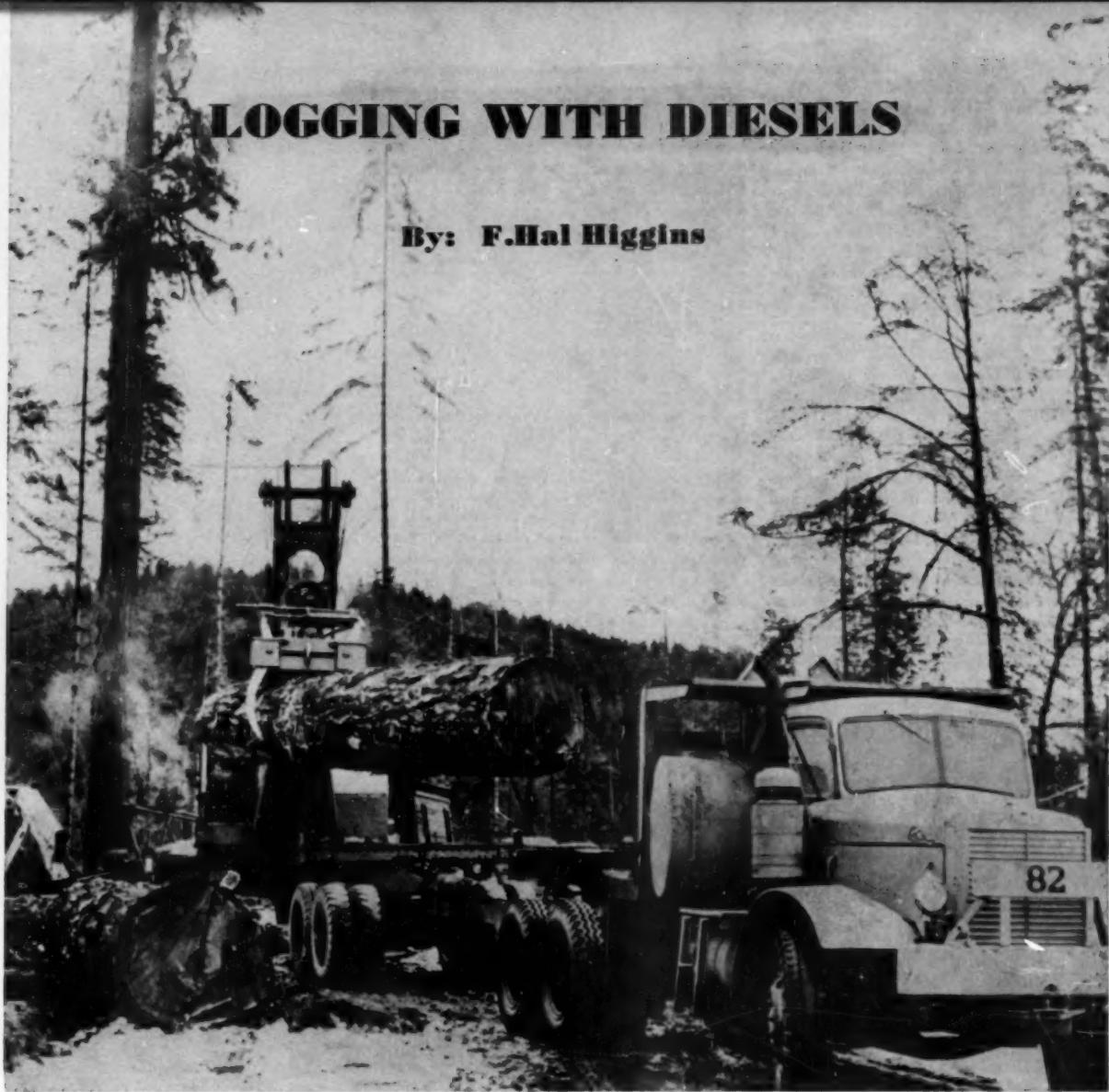
*The Choice of Power Experts*



**Enterprise**  
STATIONARY  
**Diesels**

# LOGGING WITH DIESELS

By: F. Hal Higgins



Mack diesel truck being loaded by 1½-yd. Bucyrus-Erie shovel with logging tongs in Oregon on Weyerhaeuser Lumber Company operations.

THE logging industry of the northwest is riding at an all-time high on the greatest peacetime building boom in our history plus a shifting into a war basis. This northwest lumber industry has done a great repowering job since war's end, which has permitted unlimited buying of the newer models and tools powered by diesel engines. In a recent visit to the Oregon-Washington-Idaho headquarters for logging equipment, the writer checked up on the post-war logging industry via his old friends in the equipment industry. A call on the dean of the logging equipment industry found an old friend of some 22 years acquaintance who has another 18 years experience in selling and servicing equipment for the lumber industry in the northwest. The graying veteran who has seen all the modern logging equipment develop since the days of "bull logging" is C. I. Sersanous.

Claude Sersanous is the treasurer of the Loggers & Contractors Machinery Company that was organized over 40 years ago.

A look around Loggers & Contractors' headquarters at Portland was an eye-opener as to the current "tools of the trade." The writer can recall when the Sersanous brothers—Claude and Freeman—had little equipment in their place of business except the old Caterpillar gas Sixty, a line of steel cable, and some blocks, hooks and log chains. Now their Catalog No. 49 lists 33 manufacturers whom they represent and practically all with engines are diesel. Here are some noted on the floor or out in the Tillamook burn a few miles west of Portland: Buda earth drill, with Buda diesel engine; Galion motor graders and road rollers, with International diesel engines;

P & H excavators, shovels, draglines, cranes, pile drivers, clam shells and skimmers; Hercules engines and power units; Ingersoll-Rand compressors; R. G. LeTourneau, Inc., dirt moving equipment powered with Cummins, GM or other diesel engines to order; Oliver Corporation tractors with Hercules diesel engines and International Harvester diesel engines.

With branches at Klamath Falls and Eugene, Loggers & Contractors covers the Oregon timber country for strategic service to all areas. The rise of road building in recent years has greatly enlarged the business with contractors and state and county governmental agencies. "The reforestation of cut-over lands is the big job the logging industry is trying to do at the present time," observed Mr. Sersanous in opening the conversation on this

renewal of old acquaintance. "Our reforestation act has been in effect since 1917, I think. At that time Gov. Snell and Nels Rogers were the top-flight men in putting this act over. Both are now deceased; Gov. Snell was killed in a plane crash, and Nels Rogers died a few months ago from natural causes. Note the brochure here covering that Reforestation Act, called 'Oregon Forest Fee and Yield Tax Law.' The Act really marks a new and constructive long pull era opening up to the forestry to put it on a farming, or sustained yield basis such as European countries reached long ago.

"In 1909, two years before the present Oregon State Board of Forestry was formed, the problems of forest conservation and taxation had become such important questions that the responsibility of presenting a solution was placed in the hands of the federal government. President Theodore Roosevelt appointed a commission, including Fairchild and other pioneers in forest taxation principles, to lead the way in studying the assessment of forest properties. This study was designed to present a solution which would discourage the liquidation of forest properties and one which would provide means for owners to hold and perpetuate their forest crops. The work of this commission was the first public acknowledgment that commercial forests could not be properly managed unless the tax assessment was in accordance with

their productive capacity. During this period and following years many of the timber producing states undertook to solve their own taxation problems which were peculiar to the business of raising a forest crop. Some forest statutes appeared on the law books, but for the most part they merely provided a bare beginning and were largely experimental. With the exception of the enactment of the Clarke-McNary law of 1924 which provided increased fire protection for forest investments, few concrete property tax reforms were passed until the late 1920's. The Clarke-McNary law also contained a provision authorizing the establishment of a forest taxation inquiry which resulted in the excellent Fairchild report on forest assessment and taxation in 1935.

"Since the turn of the century the citizens of many lumbering states had seen the possibilities of sustained yield and forest cropping disappear as landowners followed a program of cutting out and moving to new areas. Excessive forest taxation, while not the only factor contributing to a forest liquidation policy, nevertheless, did to a considerable extent, bring about this condition. Progressive legislators in Oregon, aware that timber growth was not maintaining pace with the cut, introduced and passed a forest tax law in 1929 which was designed to encourage owners to retain cut-over forest lands and to practice forestry.



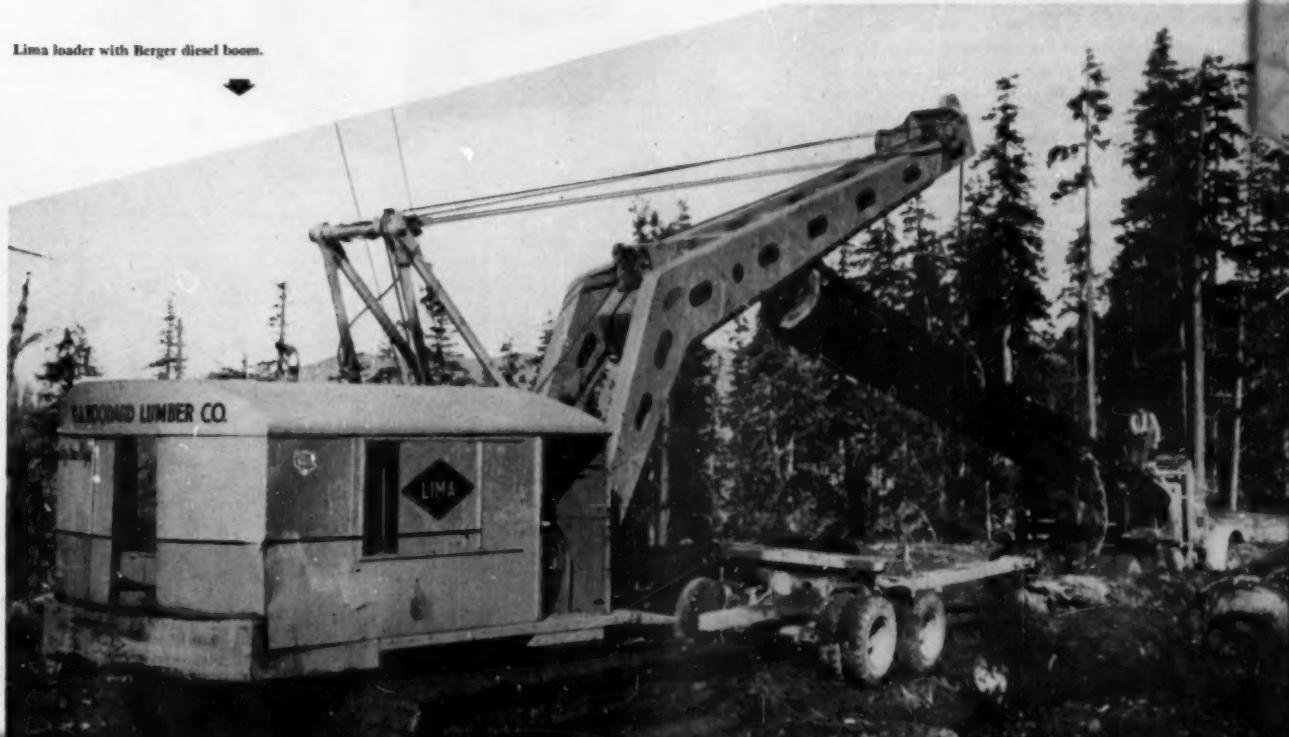
Hamilton Bros. P. & H. on the edge of the burn. Waukesha diesel in dragline.



Pope and Talbot (100 years in logging and shipping) operations. G. M. diesel in P. & H. shovel with Berger tongs loading logs.



Lima loader with Berger diesel boom.



"This law, known as the Oregon Forest Fee and Yield Tax Law, and often referred to as the Reforestation Act, has been in effect since that time. The principle of a yield tax which is the main feature of the law, is the result of long years of research and includes many of the practical features of similar forest tax laws as enacted in other timber producing states. Periodically, new features have been added to the Oregon law to meet the changing requirements of local forest conditions.

"The law is designed to aid private landowners in retaining ownership of cut-over and immature forest lands by means of an equitable taxation policy. Under this program all lands classified as reforestation lands lying west of the summit of the Cascade Mountains are assessed at five cents per acre and all lands so classified east of the summit of the Cascade Mountains are assessed at two and one-half cents per acre. Forest crops harvested from classified lands are thereafter subject to a 12½ per cent yield tax of the unit stumpage value. One of the provisions of the law is designed to stabilize forest ownership, particularly that of recent cut-over and fire depleted areas. Normally, the usual property tax, with costly annual assessments and fluctuating rates, constitutes one of the major obstacles hindering the organization of immature and cut-over forest properties into permanent sustained yield areas. This handicap is overcome by the nominal and fixed forest fee which is more in keeping with the income producing capabilities of low-value land. Such a progressive tax law also makes it possible for the small landowner with a limited amount of capital to continue ownership of immature forest stands and follow proper forest cropping practices.

"Each year the Oregon State Board of Forestry determines which forest lands within the state may be classified under the yield tax law. Lands which meet the requirements come within two categories

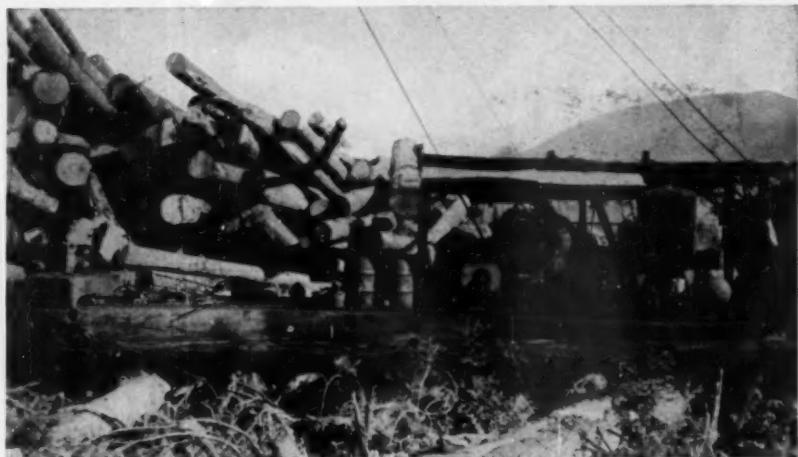
—those lands which have been cut-over and upon which only the seed trees remain, and those bearing an unmerchantable and immature forest cover. Following official classification by the State Tax Commission, the forest fee and yield tax lands are carried on the county assessor's records at a fixed annual rate of five cents per acre in western Oregon and  $2\frac{1}{2}$  cents per acre in eastern Oregon. The fee is payable at the same time and manner as the usual ad valorem property tax. When timber is harvested from lands so classified, the owner is required to obtain a harvesting permit from the State Forester and pay a  $12\frac{1}{2}$  per cent yield tax to the local county. This tax is based upon the unit stumpage value and is collected by the State Forester who turns it over to the tax collector. Notarized cutting reports are filed by the owner twice a year on January 15 and July 15 indicating the species and quantity of timber cut. The payment of a yield tax is not required when limited quantities of fuelwood, posts, Christmas trees, etc., are cut on the premises for the owners' personal use. In the event the owner does not follow accepted forest practices or is engaged in land development which would prevent continued productivity of the forest stand, the Board of Forestry may recommend a change in classification. Classified lands must be devoted exclusively to growing forest crops except for regulated or interim grazing as approved by the State Forester. Any lands declassified are returned to the ad valorem tax roll."

*New diesel-powered logging tools.* "We have some new tools coming into the woods since war's end," added Mr. Serauson. "Look at this GM-powered P. & H. loader on the Pope and Talbot logging operations. That really puts the logs on the trucks in a hurry. Here's a fine shot at our Oliver Hercules diesel crawler tractor logging in sloppy mud up to the top of the tracks on the Weyerhaeuser Timber Co. operations at Springfield, Oregon. Note that Berger air tong powered by another diesel. That's rugged work in any language. Here is a heavy duty truck, backed in a tight slot between piles of logs as it is loaded. Diesel, of course, because of the tremendous savings for that kind of power, is now being used in practically every spot it can be applied in the woods. It cuts fire risks as well as costs of getting out logs. Another scene from Weyerhaeuser's operations near Springfield shows a Mack diesel heavy duty truck being loaded by a Bucyrus-Erie air tong, the 42-inch tong being hung on the  $1\frac{1}{2}$ -yard shovel." The W. A. Woodward Lumber Co. has a Lima loader with Berger boom, a diesel engine powering the Lima. Out on the edge of the famous—fearful, or awful is a better descriptive word—Tillamook burn west of Portland was seen a Waukesha diesel loading big logs by tongs on a power shovel for Hamilton Brothers. A look at the diesel yards was a revelation when one recalled the old steam jobs that were standard for so many years. Two that stood out in the tour of the logging areas were powered by GM and Cummins diesels. Loggers & Contractors have the exclusive agency for this Berger yarder and are installing many of them throughout the logging areas.

Forty-two inch air tong on  $1\frac{1}{2}$ -yd. Bucyrus shovel. Mack diesel truck.

A rainy day visit to the Oregon State Board of Forestry office, 30 odd miles west of Portland on the edge of the Tillamook burn, found this organization set up and starting to work with a small fleet of Caterpillar diesel tractors in the biggest job ever undertaken by a state in rebuilding a destroyed timber area that is the most desolate scene of destruction the writer has ever seen,

whether viewed from auto or air. But the state boys know what they are doing, have surveyed the areas, mapped their strategy, and are doing a really constructive job in bringing a big patch of the state's timber back into tax paying use eventually. Also, they are doing their own job instead of letting Washington do it with all the bureau abuses and handcuffs that go with bureaucracy.



Cummins diesel on Berger yarder at work in woods.



Cummins diesel in a Berger yarder.



# A DIESELIZED CABOOSE

**Diesel Generators in the Caboose Make Mountain Railroadin' Safer and Faster**

By CHARLES F. A. MANN

**R**UNNING freight trains in the western mountains and through the Alleghenies, white, green and blue mountains "back east," over long stretches where the enginemen never see the caboose is a regular practice that makes it possible to haul a ton of freight one mile for less than a penny. So long has this been practiced on U. S. railroads that a whole generation of trainmen have grown up in the sly knowledge of how to spot a caboose a mile back from the engine by marks on the rocks beside the roadbed or notches on signal stands or telephone poles, and clear the head or rear end of a 100-car freight train nicely, just in time to pass the evening Zephyr without much delay to either train by old standards. But these old standards are giving way to today's single and multiple track train operation that demands everything be kept moving. The loss of a few seconds at turnouts, approaching and leaving yards, passing in CTC territory, and waiting for exchange of signals with flags, lanterns and engine whistle sequences, piles up into perhaps hours. And where slow, long freights play leap-frog with fast passenger trains, the losses pile up for both in every direction. Basically, it involves the solution of the single question: "What will improve coordination of operation of trains on the line and speed up or remove entirely, the time-lags in train movements by the old methods?"

The Santa Fe, with a beautiful mountain line with almost suburban volume traffic, between San Bernardino and Needles, California, 40 per cent of which has not only Santa Fe, but Union Pacific mainline traffic as well, has successfully speeded up freight trains and eliminated passenger train delays on its busy lines out of Barstow, east 167 miles to Needles, north 141 miles to Bakersfield and west 81 miles to San Bernardino, by installing engine to caboose-to dispatcher radio communication on 28 diesel locomotives and 36 cabooses operating in three directions out of Barstow. A fixed radio station at Barstow for use by the yardmaster and identical ones at San Bernardino and at Bakersfield. Beyond the 20-mile range east, toward Needles, the locomotive and caboose radio sets are used primarily for head to rear communication. The system operates on 160.65 mc. and similar in every respect to 10-party rural lines, with pushbuttons that permit each man to talk to his caboose and to the three fixed terminal stations freely, with everybody listening and keeping track of the other fellow as well as his own outfit. Principal savings are nerves, shoe leather of trainmen and time in train moves.

Bendix equipment is used throughout, on the

locomotives and cabooses. Operations required 135 volts, 60-cycle ac. current with a maximum of 230 watts needed in sending. On the diesel locos, this power is supplied by a small rotary converter made by the Eicon Company, rated at 300 watts output and use 64 volts dc. from the diesel loco storage battery. On the cabooses the power is supplied by a small Lister-Blackstone diesel developing 2.5 kva. at 1,200 rpm. These are push-button started from a 32-volt, 180 ah. Exide battery mounted in a box under the caboose floor. The diesel generator set is mounted in a compartment in a fireproof and soundproof box, and run so quietly that it is difficult to tell whether or not it is running or shut down. A 25-gallon fuel tank fitted will run the unit 75 hours, more than enough for any run out of Barstow. The diesels are tested every 90 days and general overhaul once each year.

So, with the conductor and rear brakie in constant contact with the engineer, fireman and head brakie, and when far enough away from terminals so that orders from the dispatcher and yardmasters at the terminals will really save time if the train crews can be informed while running full speed, the minutes-per-train saving on the Santa Fe piles up into enough hours per month to please both the shipper and the Santa Fe operating department, and save far more than the cost of the radio installation.



# RENSSELAER INDIANA

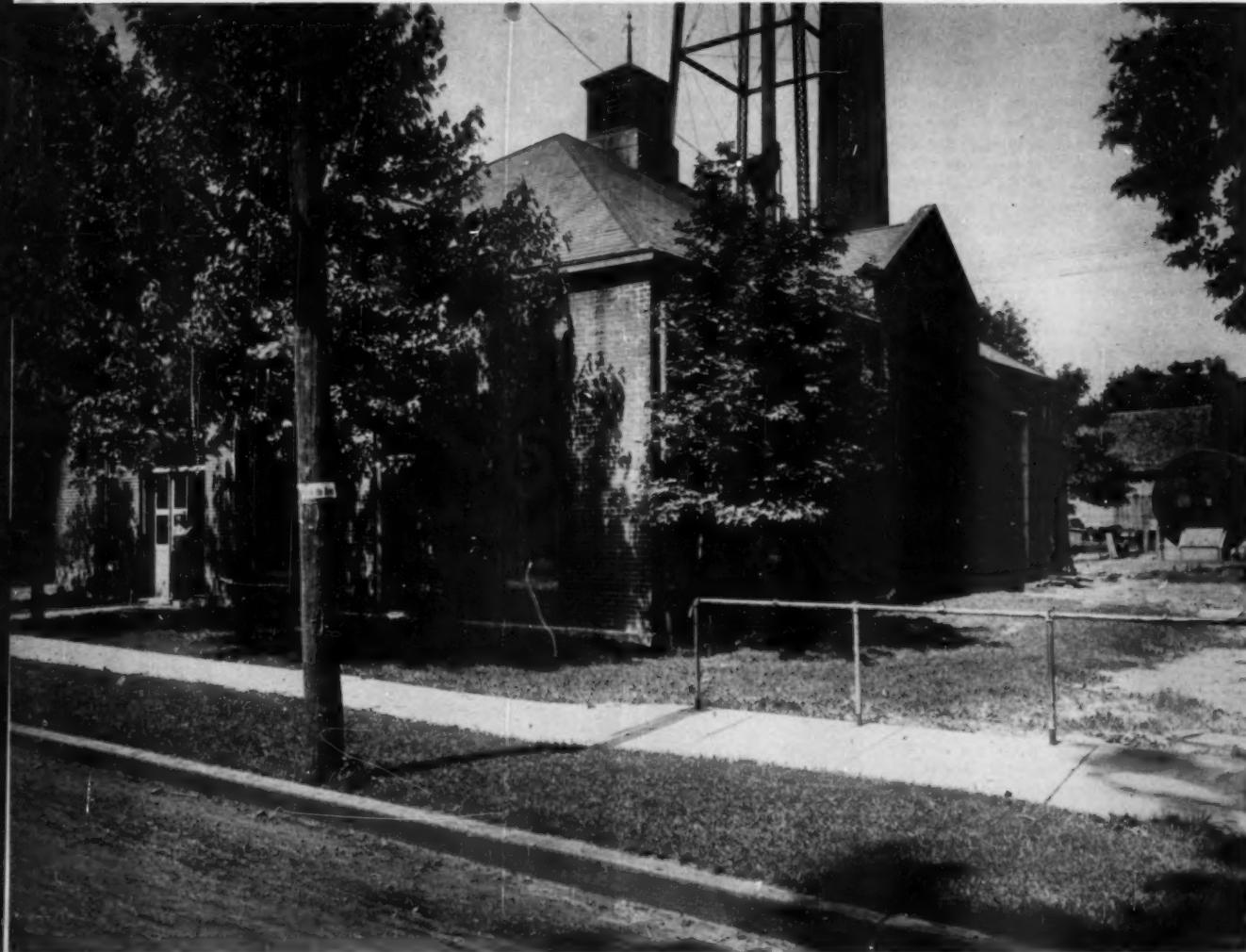
By DOUGLAS SHEARING

**I**N THE early years of the city owned power plant at Rensselaer, Indiana, two services were supplied, electricity and heat. Power was generated by steam engines, the exhaust from which was used to heat two nearby grade schools and the high school. With the demand for heat during the heating season about balancing the amount of exhaust steam that came from power generation, this seemed to be an ideal arrangement at the time. In later years, however, the growth in electric service had reached a point where the demand for electricity far surpassed the heating demands and which eventually led to abandoning the heating service.

The city started supplying municipal service in 1898 with the purchase of a privately owned plant for a price of \$9,000.00. The original plant had been built in 1888 and consisted of a small return tubular boiler and a 60-hp. slide valve engine belted to a single-phase, 133-cycle, 1,100-volt generator. In the years which followed, additional and larger engines and boilers were installed and the electrical system changed to 3-phase, 60-cycle. By 1921, it became evident that the 20x12-inch Corliss engine with its 200-kw. generator and a 15x20-inch high-speed engine of 100-kw. capacity were insufficient for the city's growing demand for electric service. Operating costs, too, had risen

to the point where something had to be done to provide lower cost generation. A consulting engineer was engaged and after several projects were considered, it was decided to abandon steam power and install diesel units for all future expansion. It was not until 1924 that all details had been worked out and in that year the first Nordberg diesel was installed, this being a 3-cylinder, 15x20-inch, 2-cycle air injection crosshead constructed engine of 550-hp. with a 375-kw. generator. This engine was installed in the existing building in space formerly occupied by the pumps of the city water system and which had to be removed to a newly constructed building before installation

*Around and over this original building was built Rensselaer's modern brick power house. When enclosed, this old station that had seen forty years of service, was removed.*



work could be started on the engine. No change was made on the building. The air suction line of the engine was carried to a cupola on the roof, which effectively silenced the suction and the exhaust carried to the brick smoke stack, which served as a silencer.

Since steam still had to be supplied to the three schools and a steam engine kept available for stand-by service, the steam plant could not be abandoned at this time. In order to keep one boiler ready, if needed, a waste heat generator was placed in the exhaust line of the diesel engine, which with a banked fire, maintained pressure in one boiler so that the steam engine could be placed on the line quickly, if needed. The plant continued to operate under this condition until 1928, when the load had reached a point where more generating capacity had to be added. In that year, another Nordberg diesel was installed. This was also of the air injection cross-head design, of 875-hp. with 600-kw. generator and was located in the space that had been occupied by the Corliss engine. Steam was abandoned with the installation of the second diesel. A comparison of steam and diesel operation shows the savings in fuel that were accomplished with the more efficient type of power unit. The last year that the steam engines were used, the cost of coal alone to generate 900,000 kwr. was \$24,000. The following year, the diesel engine required fuel oil to the amount of \$8,186.05 to produce 1,023,000 kwr. The comparative fuel cost per kwr. was 2.66 and .8 cents respectively.

A reduction in rates was put in effect as each diesel was added. This resulted in a rapid growth in load, particularly from electric ranges, since Rensselaer had no gas system. From this and other sources, the load continued to increase, and by 1932 a third Nordberg diesel had to be installed. This was also an air injection engine of 1,425-hp. with 1,000-kw. generator having about the combined capacity as the first two units. The old power house could not accommodate a third unit and it was decided to replace it with a modern building that would meet the city's needs for some years, but capable of being extended if necessary. Since the original plant was centrally located, it was decided to build on the same site. This was not an easy task, since it meant building over and around the old building and at the same time maintaining service with the existing equipment. When enclosed, the old building that had seen almost forty years of service was removed.

The conditions which prevailed at Rensselaer were typical of most municipal plants. Increased use of electric service kept pace with added generating capacity. By 1940, the load had again grown to the point where a fourth unit was needed, in that year a 6-cylinder mechanical injection 1,500-hp. engine was added, which brought the plant capacity up to 3,350 hp. With this engine in operation it was thought that the plant could take care of the city's needs for some years to come, but within eight years, consideration had to be given to further expansion. The building would not accommodate another engine and it became necessary to purchase adjacent land for this purpose. At the same time an order was

placed for a fifth Nordberg engine, this unit having a capacity of 2,800 hp. The engine went into operation in 1950 and gave the plant a total of 6,150 hp., one of the larger municipally owned diesel power plants in Indiana.

This latest engine has 7 cylinders of 21½-inch bore and 29-inch stroke, of mechanical injection trunk piston design, and operates at 225 rpm. It drives a 2400/4160-volt, 3-phase, 60-cycle, 1,980-kw. generator with 25-kw. V-belt driven exciter. Since placed in service, this engine has carried the major portion of the load. Normally it is operated from 14 to 16 hours each day until the load drops to where it can be carried by one of the smaller units. In March, the engine operated 444 hours, generated 475,500 kwh. on 36,440 gallons of fuel oil or a production of 13 kwh. per gallon with the engine carrying an average load of 54 per cent. The lube oil consumption for this period was 10 gallons in the crankcase and 126 gallons for cylinder lubrication for a total of 136 gallons or at the rate of 9.141 hp. hours per gallon of lube oil. Comparing present day production of this new unit with that of the plant when diesels were first installed, we find that in two months the new 2,800-hp. engine generates an amount about equal to the entire annual output in 1925.

Mounting costs have affected operations at Rensselaer in the same manner as other plants engaged in the generation of power. In 1940, 4,067,200 kwh. were generated with a fuel cost of \$18,914.50, while in 1949, the production had grown to 6,906,500 kwh., but the cost of fuel had risen to

\$74,470.29. The fuel cost per kwh. had almost doubled. Operating labor also had shown a similar increase. This has increased from \$4,130.54 in 1940 to \$8,016.30 in 1949.

For Indiana cities in the 2,500 to 10,000 population group, lighting rates at Rensselaer has long been amongst the lowest in the state. Residential consumers enjoyed the low rate of 3.6 cents for the first 50 kwh. used per month and 1.8 cents for all over 50. In 1949, it was necessary to put a rate increase in effect to offset the inflationary costs of fuel and labor. The present rates are as follows:

#### Residential Lighting

First 50 kwh.	5 cents
Next 50 kwh.	3 cents
All over 100 kwh.	2 cents

#### Commercial Lighting

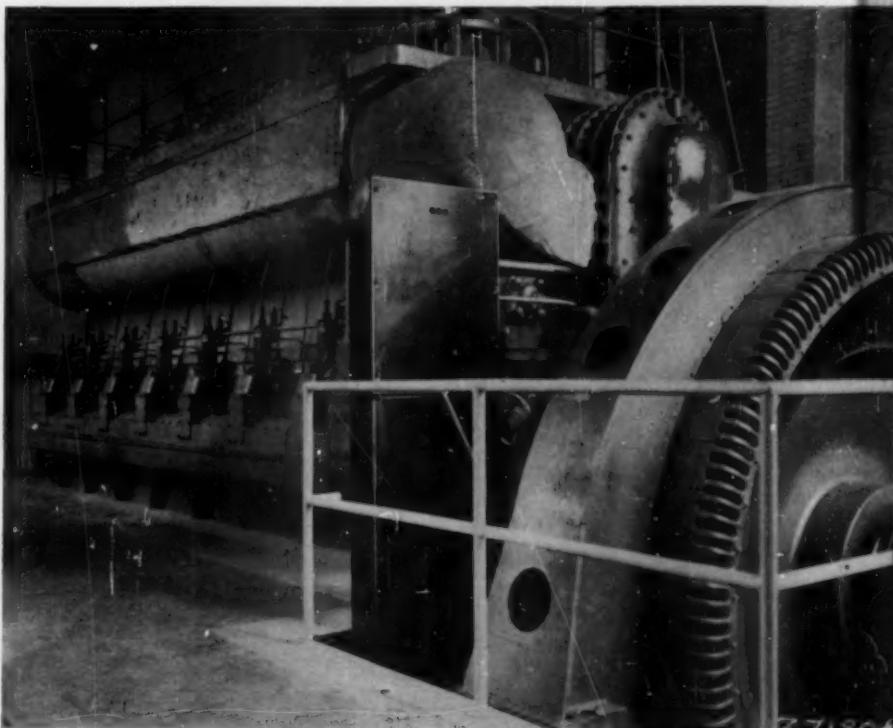
First 100 kwh.	5 cents
Next 200 kwh.	4 cents
All over 300 kwh.	3.5 cents

#### Power

First 400 kwh.	4 cents
Next 300 kwh.	3 cents
Next 10,600 kwh.	2½ cents
All over 11,300 kwh.	2 cents

While most municipal plants reach the peak load in early evening, the peak on the Rensselaer plant comes at the noon hour. This is accounted for by the extensive use of electric ranges. More than

The new 2,800-hp. Nordberg diesel engine drives a 2400/4160 volt, 3-phase, 60-cycle, 1,980-kw. General Electric generator.



half of the residential customers use electricity for cooking since gas service is not available.

Provision is made for an adequate supply of fuel in case of emergency. At the present time, fuel is delivered to the plant by truck, three times a week, from the refinery at Whiting. In addition to truck delivery, fuel can also be received by rail. At a siding about six blocks from the plant is a 90,000-gallon vertical tank with pump house and a small motor driven pump for unloading and transfer to truck. At the plant are two 26,000-gallon above ground horizontal storage tanks with motor driven pump for unloading. From these tanks, fuel is delivered to an elevated inside storage tank by a pump driven by a 1-hp. motor. From this tank all five engines receive their fuel, which flows by gravity to the engine day tanks. The day tank for the 2,800-hp. engine is located outside the engine room wall in a storage room at one end of the new extension to the building. From the day tank, fuel flows by gravity to the engine driven fuel pump, then through duplex filters and then to the fuel header from which the injection pumps receive their supply. In this storage room there is also a pump driven by a 1½-hp. motor permitting transferring fuel direct from outside storage to the day tank should there be a failure to the normal method of fuel delivery.

In the early days of the diesel plant, considerable difficulty was experienced due to the corrosive action of the water on the piping, and as a result, closed cooling water systems were installed for all engines with soft water used for both the cooling and jacket water circuits. A zeolite water softener is used. For the four older engines, there are two atmospheric-type cooling towers of wood construction while the new 2,800-hp. engine has a forced air tower of metal construction. Raw soft water from the tower is circulated through a lube oil cooler and then through a heat exchanger by a 20-hp. centrifugal pump of 700 gpm. capacity at 70-foot head and then back to the tower. The jacket water is circulated through the heat exchanger by a 15-hp. centrifugal pump of 700-gpm. capacity at 70-foot head. The jacket water circuit has an overhead surge tank. Provision is also made that should there be a failure of the cooling system, raw city water may be used in an emergency for the jacket and oil cooling circuits.

Like other Nordberg diesels of this type, the 2,800-hp. unit has two systems of lubrication. The pistons are lubricated by force-feed lubricators, one for each cylinder and which deliver oil to six points around the periphery near the upper end of the liners. Lubrication of the crankshaft journals, crankpins, piston pins, camshaft bearings,

gears and other parts requiring lubrication and the cooling of the pistons are cared for by a circulating pressure system. Oil from the bearings and the pistons drains into the sump, where a built-in pump circulates the oil through a duplex strainer, the lube oil cooler and then back through the engine for recirculation. An oil purifier operates continuously, taking oil from the sump, and after purification again returns the oil to the sump supply. A 285-gpm. auxiliary lube oil pump driven by a 15-hp. motor serves as stand-by and for supplying lubrication before the engine is started and after it is shut down. A pressure switch starts the pump should the lube oil pressure drop below a predetermined point.

Air for scavenging is brought to the engine by a gear driven blower mounted at the flywheel end and takes its suction through a continuous self-cleaning curtain type air filter having a capacity of 12,900 cubic feet per minute. A five panel electrically operated switchboard is located adjacent to the operating side of the 2,800-hp. engine. This board has a tie-in panel to the main distributing board. A 60-cell battery furnishes the energy for operating this board.

Since the plant is located in a residential section, within three blocks from the business district,

Rensselaer's attractive red brick power house. The recent addition was made to left side of the building to accommodate the new 2,800-hp. Nordberg diesel engine.



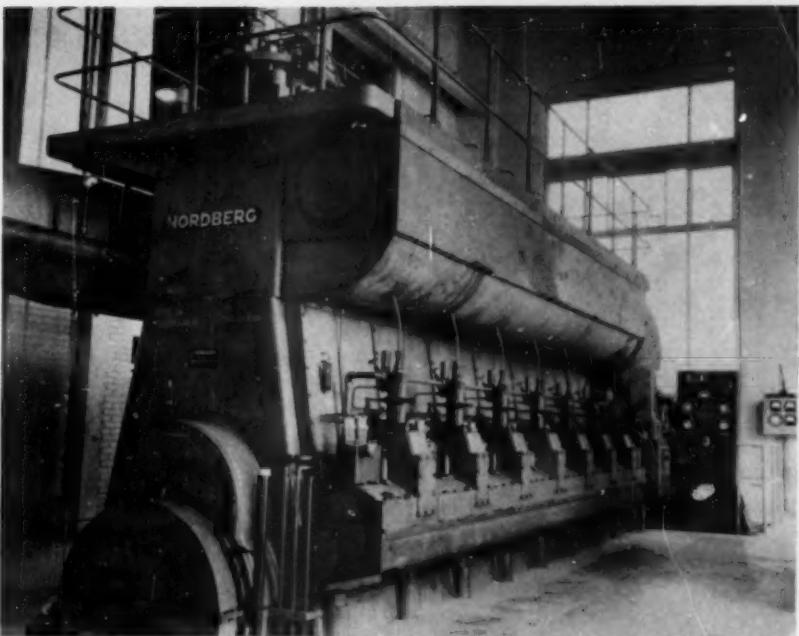
nearby to a high school, two public schools, library and two churches, quiet operation is paramount and the noise has been so effectively silenced that anyone passing the plant is scarcely aware that the engines are running. The 2,800-hp engine has both exhaust and intake snubbers. Mounted on the engine gage board is an alarm for low pressure and high temperature of jacket water and lube oil. Also on this board is a pyrometer for determining exhaust temperatures.

Rensselaer can be proud of the record of its municipal power plant, which is a valuable asset to the city. It has grown from obsolete, inadequate steam equipment to efficient diesels housed in a modern building and with ample capacity to care for city's needs for electric service. Never has the city had a failure of power supply. The successful record of the plant in no small measure is due to its supervision and experienced operating personnel. Louis C. Ramp, superintendent of both the electric and water systems, has long been associated with the plant and it was under his supervision that the last two diesel installations were made. Mr. Ramp designed the installation of his newest diesel generating unit to be as independent of the rest of the power plant as is economically possible. Also the new unit has been installed at a higher level and without basement. These later improvements were the result of Mr. Ramp's experience with floods and deterioration of piping cooling waters.

#### List of Equipment

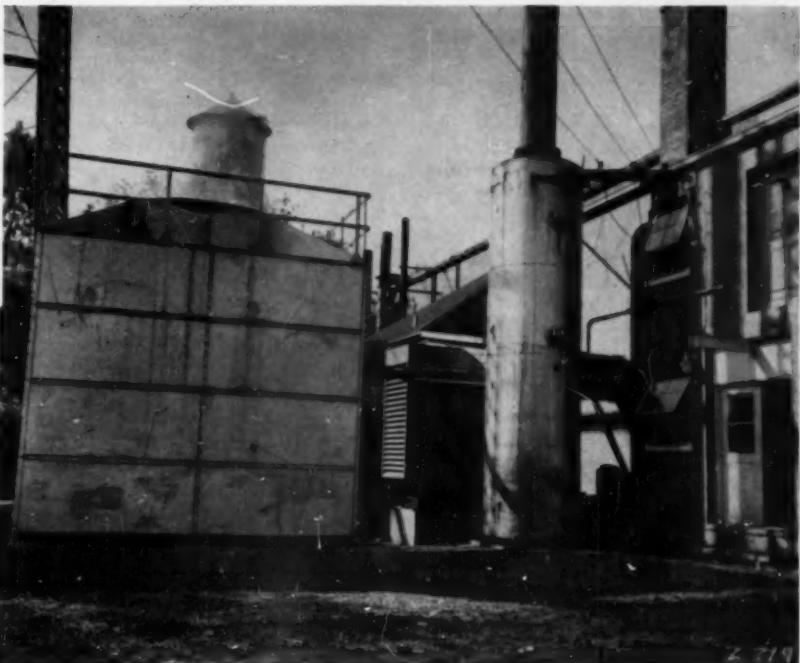
Air Filter—American Air Filter Company.  
 Auxiliary Lube Oil Pump—Blackmer.  
 Battery—Exide.  
 Duplex Fuel Filter—Nugent.  
 Electrifugal Pumps—Allis Chalmers.  
 Exhaust and Intake Snubbers—Burgess Manning.  
 Forced Air Cooling Tower—Marley.  
 Fuel Transfer Pump—Blackmer.  
 Generator for 2,800-hp. Engine—General Electric.  
 Heat Exchanger—Ross.  
 Lube Oil Cooler—Ross.  
 Main Engines—Nordberg.  
 Oil Purifier—Honan-Crane.  
 Pyrometer—Alnor—Illinois Testing Labs., Inc.  
 Switchboard—General Electric.

Honan-Crane oil purifier, day tank and Blackmer auxiliary fuel transfer pump set at engine room level as precautionary measure against high water damage.

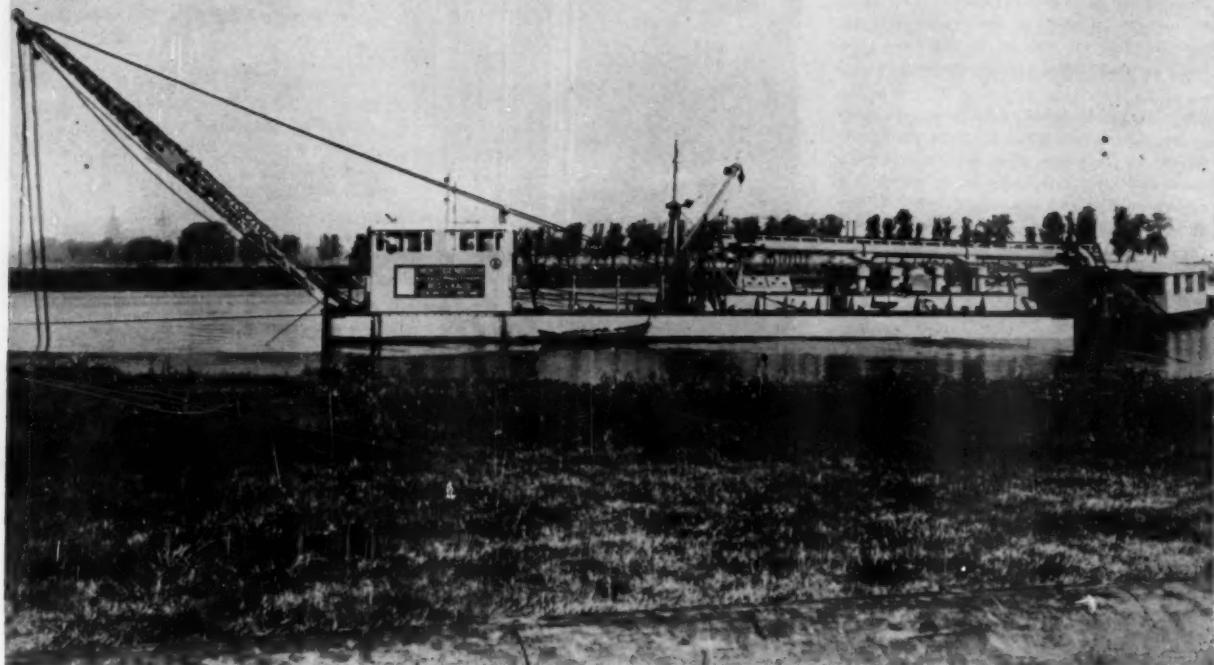


Marley cooling tower, Burgess-Manning snubber and American continuous air filter located in rear of plant.

The latest addition to the power plant at Rensselaer is this 2,800-hp., 1,900-kw. Nordberg diesel engine generating unit. Alarm system is located on operating panel and gauge board to right of engine.



# DIESEL DREDGE IN NIGERIA



Five Caterpillar diesel electric sets generate electric power for a floating cutter pump dredge which is used by a large dredging project in Lagos, Nigeria, West Africa.

THE people of the Netherlands have always been great specialists in the field of water-works, dredging operations, land reclaiming and other waterway applications. Today, their skill is recognized in world-wide contract work. Their floating bucket and pump cutter dredgers, always built in the Netherlands, were originally powered by steam until the advent of low-speed diesels ranging from 200-400 rpm. This low-speed requirement is desirable because the dredger chain and pump of the pump dredger must run slowly. However, the low-speed acceptance has given way to the medium-speed diesel with the recent installation of five Caterpillar D397 diesel electric sets for generating the required electric power for a floating cutter pump dredger owned by Bos & Kalis, Sliedrecht, the Netherlands. The dredger will work a large dredging project in Lagos, Nigeria, West Africa. The entire installation, built for use in the tropics, drew an original power requirement of approximately 1,200 kw., which was available from the five Caterpillar D397 electric sets, giving a total continuous output of 1,220 kw. or 244 kw. (0.8 power factor) per set. Should one of the engines become inoperative, it is still possible to develop a rated output (12 hours) of 1,100 kw., or, for one hour or less (intermittent) 1,224 kw., with the result that the dredger could remain in operation at normal capacity. These sets operate at 1,000 rpm. generating 50-cycle cur-

rent at 3,000 volts. Afterwards, it appeared that in connection with alterations in the working schedule, whereby the total capacity of the electric motor of the cutter was increased, the electric plant was also to be increased. For this purpose, an additional set was ordered, so that 1,464 kw. would be available for round the clock operation. The total yearly consumption of current is estimated at approximately 10,000,000 to 12,000,000 kw-h.

An interesting factor of the installation, and also of the dredger, is that each can be disassembled and arranged into small shipping units, for conveyance by steamer and over land by trailer. The side walls of the shed sheltering the power plant can be removed so that only the roof remains. The pontoon has been built in six parts. Each pontoon has a water-tight section which is used as a fuel tank. During transport, the engine, with attachments, is placed in this fuel tank in order to save as much room as possible. An extra pontoon is being added for the sixth set. Each electric set is built in such a way that it can operate independently from the others, while a main switchboard makes it possible for all sets to be switched together in any desired combination. The generators and switch gear are manufactured by General Electric Co.

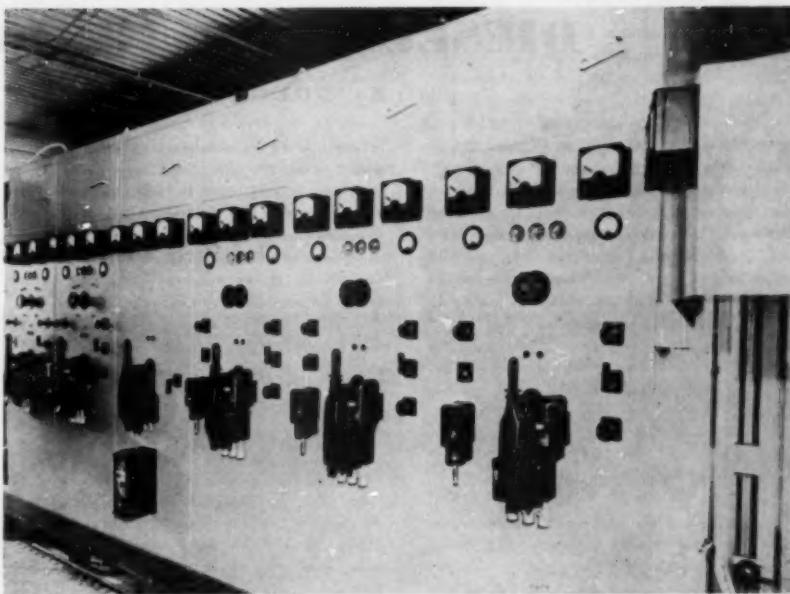
Five Caterpillar D397 diesel electric sets with Gen-

eral Electric alternating current generators, 244 kw. at 0.8 power factor, 3,000 volt, 3-phase, 50 cycles, provide continuous output. Each generator is equipped with a high temperature safety alarm device located in the generator and exciter windings. Each engine is provided with the following attachments: fuel lines; heat exchanger, 2 Burgess exhaust silencers; raw water pumps; safety alarm for high water temperature; overspeed and low oil pressure shut-off devices. One switchboard consisting of: rheostat; ac ammeter, ac voltmeter; wattmeter; air-type circuit breaker; oil circuit breaker; safety device for overload 110 per cent; automatic voltage regulator; ammeter; voltmeter and switch for exciter; hand shunt regulator; switch for the remote control motor of Woodward governor; set of synchronizing lamps. In addition, the installation is equipped with: gasoline engine driven Worthington compressor; electric motor driven Gardner Denver compressor (3 phase, 50 cycles, 110 volt motor); portable auxiliary electric driven water pump as a reserve raw water pump. A totaling main panel for the five switchboards includes: oil circuit breaker; watt-hour meter; wattmeter; frequency meter (45-55 cycles); power factor meter; 5-way single breaker switch for remote control motors of the Woodward governors; hinged panel with one synchronoscope and one bar voltmeter. Through the application of the Woodward governor on each engine it is possible

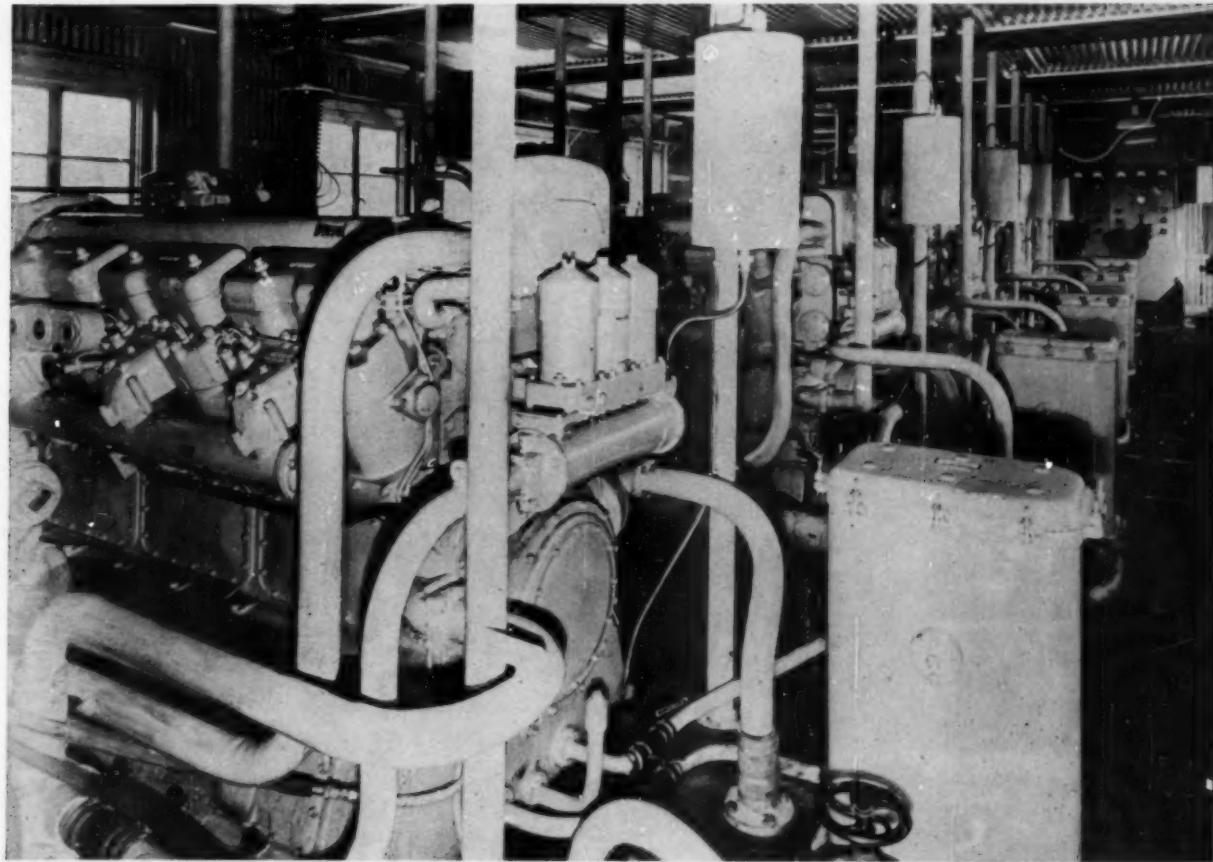
to regulate the number of revolutions and the output from the switchboard of each engine. The totalizing panel has been provided with a switch by which the number of revolutions and the output of all engines can be regulated simultaneously. This was done in order to increase, if necessary, the number of revolutions of the diesel engines and, consequently, the frequency, thereby increasing the rpm. of the dredger pump.

All fuel, exhaust, cooling and lubrication oil lines are flexible. The outlet of the raw water can go direct to outboard or to a water tank which is placed on the partition of the pontoons between the fuel tanks. This was done to keep the tanks ice-free and the raw water at a moderate temperature if the dredge should operate under severe ice conditions. A separate small switchboard has been placed with each engine. On these switchboards the lamps for safety alarm devices for engine cooling water temperature, low oil pressure, generator and exciter winding temperatures have been mounted. A signal horn warns when one of the lamps burns out.

This installation marks a new move in furnishing electric power requirements, changing from the low-speed diesel to that of the medium-speed engine in floating bucket and pump cutter dredger operation.



G-E switchboard on the floating cutter pump dredge. Five Caterpillar diesel electric sets generate electric power for this large dredging project in Lagos, Nigeria, West Africa.



# DIESELS HELP IRRIGATION

By DOUGLAS SHEARING

**T**HE HISTORY of Henderson County Drainage Districts No. 1 and No. 2 records steadily rising land production and value. As a result of wise investing in dependable drainage facilities, land worth has increased almost seven times since 1913, when pumps first lifted lowland water over the Mississippi levee. These districts are located on the Illinois bank of the Mississippi just below Burlington, Iowa. Their rich farmland lies beneath the Mississippi water level but well protected by sturdy levees along the river bank. The primary drainage problem is not floods but evacuating rain water which runs from surrounding terrain to the low-lying area. Streams within the district have overflowed only six times in the 27-year history of present pumping facilities.

First steps toward a comprehensive drainage program were taken in 1913 when representatives of the two districts agreed on joint construction and operation of a pumping station to be located near Carman, Illinois. At this time, two 250-hp. steam engines were purchased to power two 48-inch Buffalo pumps. Sixteen years later, when operat-

ing costs of the steam engines had become excessive, the Federal Engineering Company, of Davenport, Iowa, recommended and engineered complete electrification of the station. A 10-year contract was subsequently signed with Iowa Southern Utilities Company of Burlington. At the close of this period, the utility indicated power would no longer be supplied after December 31, 1938. The Illinois-Iowa Power Company then offered to take over power obligations. Before accepting this proposal, district commissioners wisely decided to investigate other modes of power. Utility bills had soared as high as \$3,000 monthly. Was there a better way?

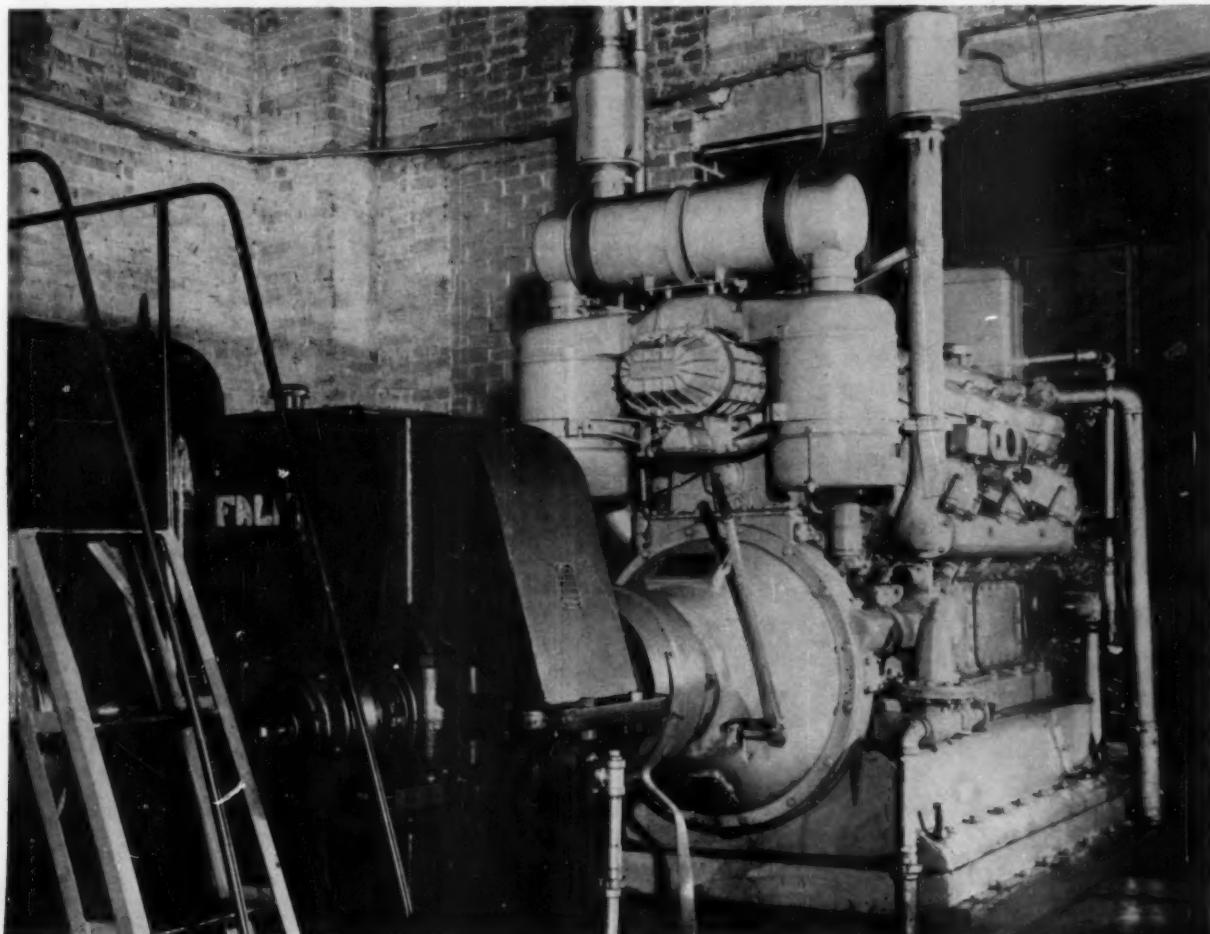
Greeley & Hanson, engineers, thought there was. They predicted substantial savings in a switch to diesels. Consequently, four "Caterpillar" D17000 engines, two for each pump, were bought. Results were gratifying. Operating costs immediately dropped to one-third their previous level. The past eleven years have proved the superiority of diesels for these Henderson County districts. This was demonstrated when district commissioners

again looked to diesel as power replacements were needed. The south pump is now manned by one of the original "Caterpillar" engines and a new "Cat" D17000, purchased in 1948. These units turn a 43-inch impeller for a maximum output of 44,000 gpm.

March, 1950, saw the installation of a 500-hp. "Cat" D397 diesel to handle the north pump. The new "V" design D397 has 12 cylinders of 5½-inch bore and 8-inch stroke. It is especially well adapted for stationary pumping service. With proper couplings, full power may be taken from the front as well as the rear of the engine. Easily removed cover plates expose six handy gear drives for powering such accessories as charging generators, small compressors, auxiliary pumps, etc. Large access doors permit fast inspection or removal of pistons, connecting rods and bearings. Location of fuel filters and pumps, governor and blower within the engine "V" makes servicing quick and convenient. Automatic safety controls insure immediate engine shutdown in case of high water temperature or low oil pressure.

This "Cat" diesel engine powers a 62-inch impeller, lifting a maximum of 95,000 gpm. over the Mississippi levee for Henderson County (Illinois) Drainage District No. 1 and No. 2 near Burlington, Iowa. Note backstop on Falk speed reducer. This device prevents water from back turning the engine in the event of engine stoppage with clutch engaged.

40



The new diesel is well fitted to the districts' finances and facilities. It provides extra pumping power needed to combat the slowly rising river level. Yet, because of its compactness and light weight (about 11,000 pounds), only minor alterations were needed on the building and engine base. This facilitated financing of the complete modernization without floatation of a new bond issue. The "Cat" D397 is set to deliver 400 hp. at 1,000 rpm. for continuous operation. The power train proceeds through a Twin Disc clutch and a Falk gear-type speed reducer to a new 60-inch im-

peller in the 48-inch Buffalo pump. In the event of engine stoppage with clutch engaged, the speed reducer is equipped with a backstop to prevent water from back turning the engine.

The north unit was designed to pump 68,000 gpm. over the levee at 15-foot total head. It pumps 95,000 gpm. during periods of lowest total head. Its renovation came none too soon—just two days before a 6-inch rainfall flooded the area and taxed pumping equipment to capacity. There are 22,000 acres in the two districts. Of this total,

16,000 is flat farmland, honeycombed with drainage ditches and main arteries. The remaining 6,000 is hilly enough to drain itself into neighboring flatlands. Grain yield per acre is an indicator of land productivity and drainage effectiveness. Farmers report corn yields up to 125 bushels per acre; soybeans up to 43, wheat to 45, and oats to 76. These yields are safeguarded by a yearly assessment of a few dollars per acre for drainage operations. The districts' history is a low-cost testimonial to wise planning, modern equipment, and neat housekeeping and maintenance.

**Commissioners for Henderson County (Illinois) Drainage District No. 1 and No. 2 and left to right: first row: Estel Whitmore, Maintenance Engineer; Chester Law and Richard Mickelson, Commissioners. Standing: Keith Sanderson, Attorney; Samuel Stevenson and H. T. Jackson, Commissioners. Not present when the picture was taken were Commissioners Carl V. Anderson and Leonard Olson.**

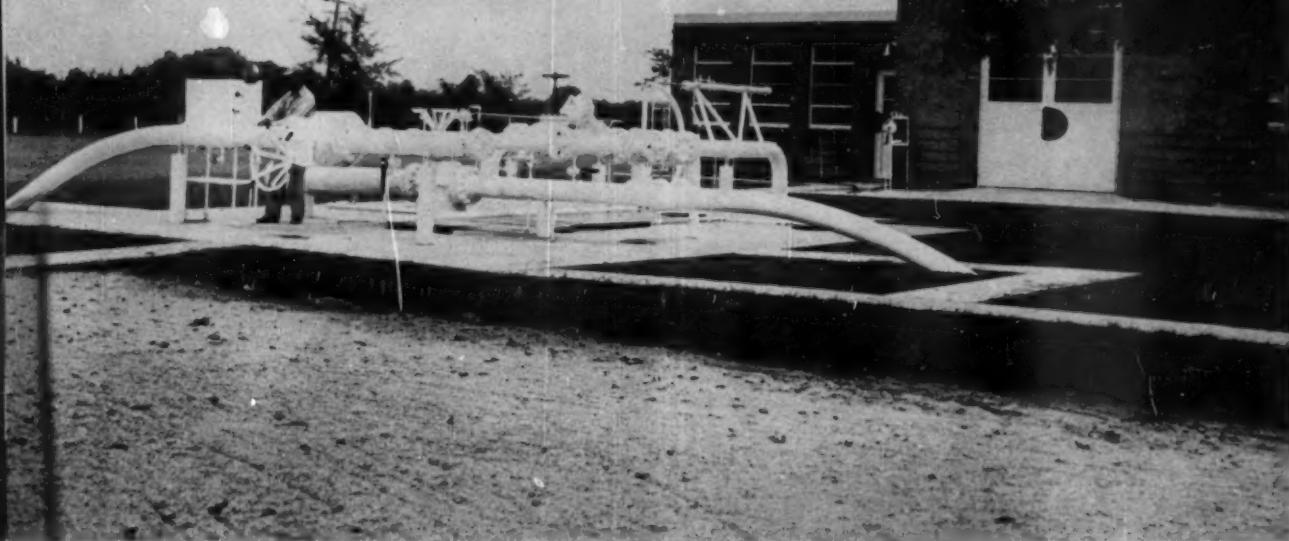


**Outside view of pumping station for Henderson County Drainage District No. 1 and No. 2 near Carman, Illinois. Station borders the Illinois bank of the Mississippi levee across the river from Burlington, Iowa. Note screens and grating which prevent debris from clogging pump intakes.**



# PIPE LINE DIESELS

By: D. A. Hoover



Outside view of Barnett station—Mr. C. C. Curvey, Chief Operator, at the valve.

**A**MPLIE use of instruments, plus a rigid operator check system, has run up an almost unbelievable record of trouble-free operation of the 810-hp. diesel installed at the Barnett station of the Shell Products Pipe Line (North Line) near Litchfield, Ill. Installed in December of 1947 to replace two and three cylinder horizontal diesel engines, this new Alco 6-cylinder, 4-cycle engine has accumulated 21,716 hours without a forced shutdown. The 12½-inch bore by 13-inch stroke engine operates at 650 rpm., with crankshaft directly connected to a Farrel-Birmingham herringbone step-up gear unit. The unit drives a Byron-Jackson six-stage centrifugal pump at 3,600 rpm. to pump 980 gpm. at a conservative rating of 3,000 head feet. This adds up to a rather staggering total of 1,050,000 barrels a month through the 8-inch pipe line.

The North Products Pipe Line runs from Wood River to Chicago, a distance of 249.79 miles. Four other stations identically equipped are spaced equi-distant along the line. Mr. C. C. Curvey, chief operator at Barnett, said: "The unit operates 24 hours a day and is never shut down except for the annual routine inspection and overhaul. We have an operator on duty at all times whose ear is tuned to the steady hum of the engine.

The slightest change of pitch is cause for an immediate investigation."

"In designing these pumping stations," Mr. Curvey said, "shell engineers left no stone unturned to insure protection to the engine. Numerous controls are installed, any of which will shut the unit down the instant a critical threat develops. For instance, we have Mercoid high-temperature controls on lubricating oil, jacket coolant, bearings and gear case. Should there be a leak of volatile fuel from the line, a gas analyzer takes over and shuts the engine down at once." The watch-dog bearing clearance alarms are of special interest. Installed in the oil sump just below the maximum down stroke of the connecting rod, they will shut the engine down if clearance increases to more than .020-inch. "In fact," Mr. Curvey said, "the engine is so guarded by automatic controls of temperature and pressure, that it is impossible to operate it unless all conditions are safe, and the line really needs the help of the unit."

Engine lubricant is 211 gallons of Shell Rotella 30, which is changed at the annual inspection. Operator Louie E. Biles remarked that he examined the piston and bearing surfaces when the engine was down for inspection and that he could have

picked up anything with his white handkerchief and not risk soiling it, so free of carbon and sludge were all of the surfaces. A Hilco hyflow filter does its part in keeping the lube oil amply filtered. Fuel used is Shell Dieselen stored in a 1,000-bbl. tank which is filled periodically from the line. Speaking of fuel consumption, Mr. Curvey said: "The engine burns about 840 gallons of Dieselen a day while pumping 35,000 barrels of products."

Coolant is Shellzone anti-freeze mixture of the proper SG for prevailing temperatures. It is cooled by three radiators, the fans of which operate selectively according to coolant temperature. Each hour the operator makes a round of the station, sometimes more often, and visually checks the conditions of temperature and pressure, even though protected by automatic controls. Exhaust temperature, lube oil temperature, jacket temperature, as well as suction and discharge pressures are watched carefully. Since economy is enhanced by steady loading and unvarying conditions, these readings really mean something at this station.

"After routine duties are taken care of," Mr. Curvey said, "the operator is free to spend his time in good housekeeping—a requirement of Shell. There

is always some sweeping, dusting or wiping to be done. Shell believes in keeping the diesel as easy to look at as any other fine mechanism. The inside of the Barnett station is as spotless as a housewife's modern kitchen." Excerpts from overhaul report of the Barnett engine 7/11/50 prove beyond a doubt, the dependability and low cost of diesel engines for the toughest assignments possible. Crankshaft deflection taken on each of the six cylinders in five positions gave ten readings of zero, two of .00025, three of .0005, one of .00075, three of .001, four at .00125, one at .00150, one at .00175, two at .002, one at .00225, one at .00250, and one at .003 inch.

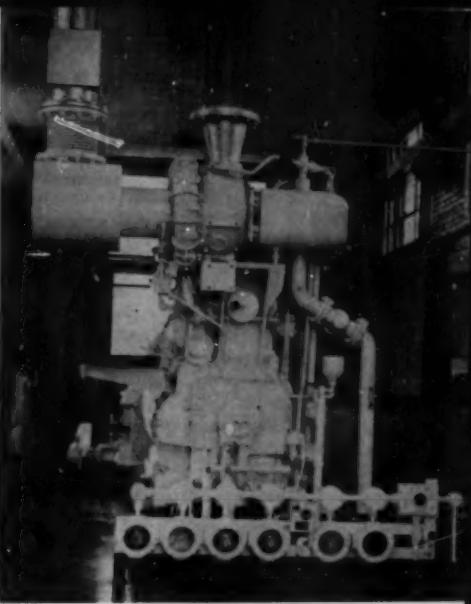
Cylinder heads: not much carbon, seats looked very good. Piston rings: 4 cylinders O.K., No. 1 cylinder .319, and cylinder No. 3, .352 width, machined out. Pistons: all in very good shape. Wrist pins: all checked as new, 5 inches O.D. Camshaft: O.K. Camshaft bearings: O.K. Connecting rod bearings: .310. All replaced as a matter of policy. Connecting rod throws on main shaft checked as good as new at 8.249 inches. Main crank shaft bearings: four retained, ten renewed at .246 inches. This as positive insurance against forced shutdown before next year. Fuel pumps: O.K. Idle gear, camshaft gear, and driving gear all

looked very good. Cylinder walls: eight measurements taken on each of the six cylinders showed average oversize of .0066 inch. Considering the 21,716 hours rung up, this is an impressive showing.

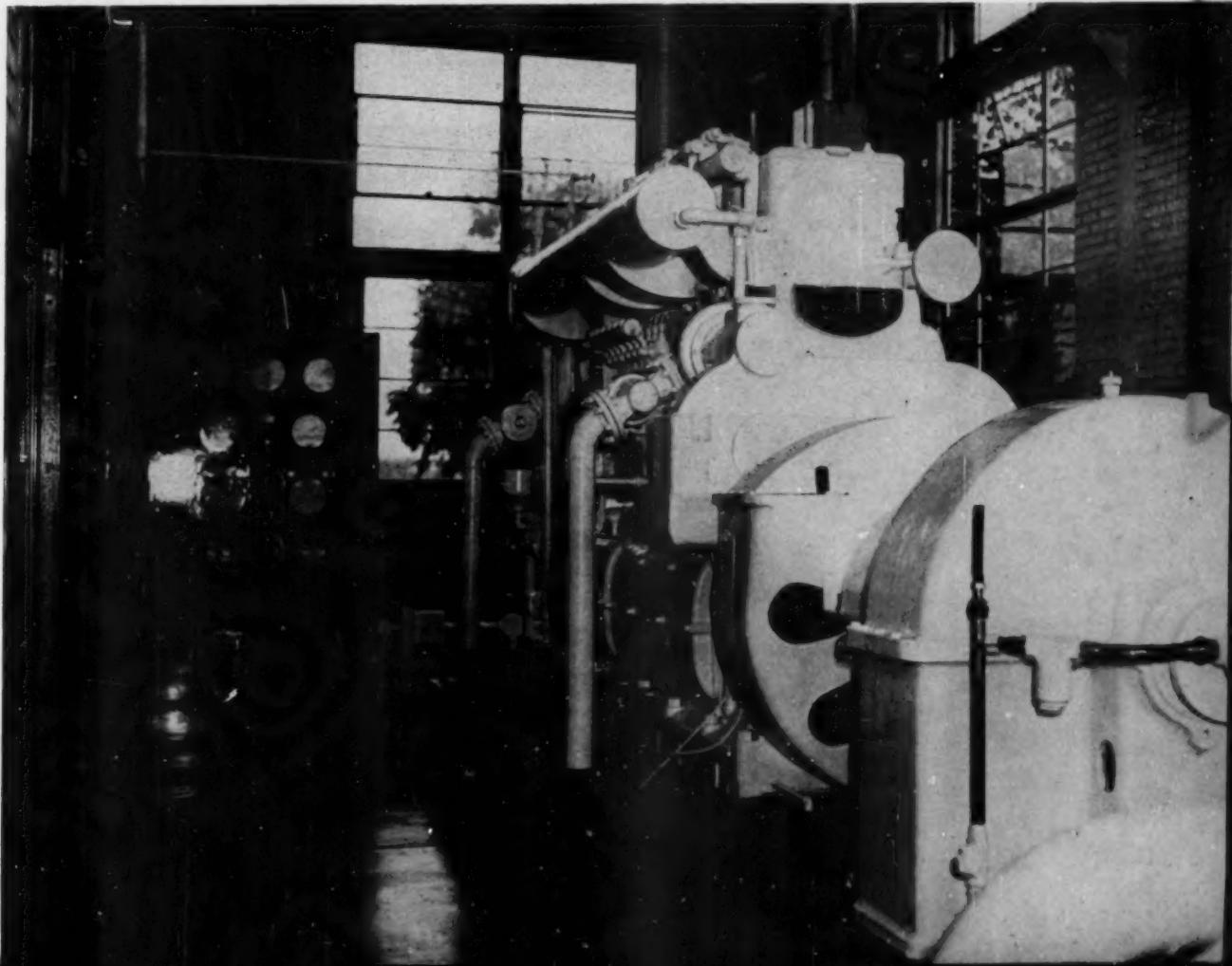
Considerable credit is due Mr. C. C. Curvey, chief operator, who worked his way up from painting pipe on the Shell Ozark Line away back in 1926. He worked for several months on the Barnett Station when it first went into service in 1928. Since then, he has held various positions as maintenance man, gauger, and oiler, until he was appointed chief operator at Barnett on August 31, 1944. Speaking of the new engine, he said: "It pays to use modern up-to-date equipment and the best lubricants available. Not only have we boosted capacity of this line 15 per cent, but operating and maintenance costs have been much reduced.

The old horizontal diesels, driving reciprocating pumps, required two men per shift and they didn't pump 85 per cent as much product as the new diesel." One man operates the new engine and has most of his time free to keep the place spotless and shining. Mr. Curvey, and V. K. Leonard, superintendent of the North Products Pipe Line are justifiably proud of the excellent record set at Barnett.

View of the Alco from drive end with instrument panel in rear showing Alnor pyrometer.



Front end view of the Alco diesel showing a few of the automatic protective devices.



# LINDSBORG - KANSAS

**Nineteen Months Tell the Story as 45-Year-Old Lindsborg, Kansas, Municipal Power Station Switches to Modern Dual-Fuel Power Production**

By WILLIAM H. GOTTLIEB

**I**N JULY, 1949, the City of Lindsborg, Kansas, paid 7.2 mills in fuel bills for every kilowatt hour generated in its municipal power plant. Just four months later the plant average was down to 4.7 mills and the most economical unit produced a kilowatt hour for a fuel cost of only 3.8 mills. This is a story of a plant in transition, of an old plant taking advantage of modern technological advance, moving forward to economies unprecedented in its 45-year history. Inside and out the Lindsborg plant gives evidence of the development program that is under way. Approach the plant from one side and you see an old brick structure which has housed power equipment for nearly half a century. Come from the opposite direction and you see an impressive ultra-modern power house of brick, steel, stone and glass. Inside the plant the same contrast is in evidence. Starting at the old end of the building you see the city's first diesel, 150-hp. Fairbanks-Morse engine, which was installed in 1925. Outgrown by the expanding load, this unit is scheduled for removal. Next comes a 360-hp. F-M diesel installed in 1929 and still an active power producer after 21 years of

service. Another step up in time and size is the 450-hp. F-M diesel put into service in 1936. The plant was again ready for expansion when World War II made new engines unavailable and for four years it was necessary to run everything in the plant to carry peak loads.

Lindsborg made a big step forward in 1947 with the installation of a 700-hp. Model 33F16 Fairbanks-Morse diesel, a heavy-duty, pump-scavenging, 2-cycle engine with full pressure lubrication and oil-cooled pistons. In two years, this unit rolled up more than 10,000 engine hours and improved plant efficiency. In those years the swiftly expanding load demanded further expansion of generating capacity and the city took its next major step with the erection of a spacious modern extension to the old powerhouse and the installation of a new big engine. The new unit, put into operation on July 22, 1949, is another Model 33 Fairbanks-Morse diesel, a 6-cylinder unit of 16-inch bore, 20-inch stroke, developing 1,200-hp. at 300 rpm. This, however, is a 33FD engine, designed for dual-fuel operation.

44



To house its new 1,200-hp. engine, which went into operation on July 22, 1949, Lindsborg built a modern extension to the old power house at a cost of \$7,500 a year.

The 15-panel board is of the enclosed type, rated switchgear, and contains a full complement of control equipment.

This 1,200-hp. Fairbanks-Morse engine is built in a separate building. It is shown here with its protective enclosure removed. The engine is a 6-cylinder unit with a bore of 16 inches and a stroke of 20 inches. It is driven by a 300-rpm motor.

Fairbanks-Morse  
1,200-hp. engine  
is built in a separate  
building. It is shown  
here with its protective  
enclosure removed. The  
engine is a 6-cylinder unit  
with a bore of 16 inches  
and a stroke of 20 inches.  
It is driven by a 300-rpm  
motor.



st 1,290-hp. F-M die-  
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irbanks-Morse dual-  
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lube purifier, the  
or and the Nugent  
l filters.



For a short time, pending arrival and installation of the dual-fuel parts, the big engine was run on diesel fuel. Then, in the latter part of November, 1949, the unit was switched to natural gas with oil as a pilot fuel. Actually this plan, like all good ones, has been in transition throughout its history, periodically expanding, improving, modernizing, but recently progress has been accelerating at a rapid rate. Thus, power production which had climbed just 457,800 kwr. in the eight years from 1938 to 1946, zoomed another 1,348,000 kwh. to a peak of 3,228,200 kwh. in 1949. The year 1950 is running substantially higher.

The effect of the new engine and the switch to dual-fuel has been so marked that progress in production economy is a story of months rather than of years. In the first seven months of 1949, before the new engine went into service, the plant generated 1,651,700 kwh. while consuming 145,650 gallons of fuel oil, an average of 11.34 kwh. per gallon. The cost of fuel per kwh. averaged 7.2 mills. In the next four months, with the new engine in operation as a full diesel, plant production was 1,014,700 kwh. on 81,550 gallons of fuel, an average of 12.44 kwh. per gallon. Fuel costs per kwh. were 6.6 mills. In the eight months from December, 1949, through July, 1950, with the new engine operating as a dual-fuel, total plant production was 2,123,200 kwh. on 79,062 gallons of oil and 20,779 mcf. of gas. Average fuel cost for the plant was 4.7 mills per kwh. In that period, the dual-fuel unit generated 1,497,500 kwh. at an average fuel cost of 3.8 mills per kwh.

It is good sense to make the economy leader of the plant the production leader as well and in the

period of dual-fuel operation cited, the new engine generated more than 70 per cent of the total plant output. In the eight months, the unit ran 3,421 hours, an average of more than 14 hours a day. The operating load factor was little better than 50 per cent, which means that the engine was well below its peak efficiency. The economics of the situation, however, justified operation even at light loads. As plant load continues to grow, there will be further improvement in efficiency and reduction in costs. Even under present load conditions, the dollar savings have been substantial. Compared with the plant average before installation of the new engine, the dual-fuel unit cut the fuel bill more than \$5,000 in the eight-month period under discussion. Annual savings are expected to top \$7,500.

In the developing of the Model 33FD16 engine Fairbanks-Morse has adhered to basic design so that every engine of the 33 Series can be converted in the field to dual-fuel operation. Thus the fuel system of the 1,200-hp. engine would be duplicated if the 700-hp. unit were converted. Word has just come to us as we go to press that parts for converting this 700-hp. unit to dual fuel are being received at Lindsborg and are being installed. Natural gas passes first through a meter and then through a regulator which cuts pressure to 25 psi. The gas then passes through a safety cut-off valve actuated by engine lube pressure. The valve admits gas to the engine only if three conditions exist: if the engine's speed of rotation is high enough to bring lube to operating pressure, if pilot fuel pressure is sufficient to insure ignition, and if engine speed is not excessive.

The gas next passes through an admission valve actuated by governor linkage which controls pressure in the gas header extending along the cylinder heads and consequently controls the quantity of gas admitted into the cylinders through constant-lift, cam-operated valves. The charge of pilot oil which initiates combustion does not vary in quantity and is injected by a separate small-volume fuel pump for each cylinder, permitting a precisely regulated supply. The engine also is equipped with standard diesel fuel pumps which function when the engine is operating wholly on oil and cut in automatically to compensate for any gas deficiencies during dual-fuel operation. Both pumps use the same injection nozzle.

To insure a favorable gas-air ratio, the quantity of scavenging air admitted to the cylinders is regulated by a governor-controlled valve. Gas and air supplies are separate and independently controlled so that there is always enough air for full combustion even with gases of low Btu. content. An additional safety factor is the physical isolation of the gas system at the top of the engine. While fuel savings are the largest single factor in dual-fuel economy, there are other advantages worthy of note. Lubricating oil economy for the big engine was already good before the switch to gas with an average of 4.888 hp. hour per gallon of lube consumed. In eight months as a dual-fuel, the engine ran 3,421 hours and consumed 763 gallons of lube for an average of 5.380 hp. hours per gallon. Lindsborg promotes efficient and eco-

nomic lubrication with good accessory equipment. Each of the Model 33 engines is served continuously by a Fuller's earth purifier. Included in the lube circuit are a cooler and strainer and a motor-driven auxiliary circulating pump. As a guide to lube handling, samples of oil are submitted periodically to laboratory analysis. Since installation of the purifiers, improvement in condition of oil and in engine cleanliness has been so marked that city engineers plan to pull pistons only once every two years instead of every year, as has been their custom.

Soft water is circulated through the engine jackets and the coils of a forced draft cooling tower by motor-driven centrifugal pumps. There are three sets of coils in the tower and piping arrangement permits use of any one or combination. Impurities are removed from scavenging air by multi-element filters housed in air chambers built into the new section of the plant. A separate alarm panel for the new engine includes an exhaust pyrometer and alarms on fuel pressure, lube pressure and water temperature. The plant's 15-panel switchboard is of the all-enclosed, unit type and is equipped with electrically-operated switchgear, voltage regulators, totalizing kwh. meters, recording kw. meter and voltmeter, watt-hour demand meter for the local REA co-op, time overcurrent relays, and ammeter, kw. meter and power factor meter for each engine panel. Electric power for the switchgear and for emergency lighting is supplied by a wet-cell battery system.

Lindsborg expects no better continuity of service from its new engines than it obtained from its veteran prime movers. In the 25 years that diesels have furnished power, there has not been a single interruption of service because of engine failure. The city expects the new unit's superior economy to continue the plant's long tradition of profitable operation. During the 10-year period 1939 through 1949, including the difficult inflationary era, the department's income topped \$650,000 as the plant produced more than 20,000,000 kwh. With department expenses at \$480,000, there was an

operating profit of \$170,000. Growing production to satisfy residential, industrial and REA requirements combined with lower fuel costs to insure a bright profit picture in the years ahead.

The plant has the benefit of experienced operating personnel. In fact, Chief Engineer Ralph Robinson and two of his operators have a combined service record of 98 years. Mr. Robinson has worked in the plant for 38, Carl Lander for 32, and L. W. Polson for 28. Operations of the Light and Water Department are under the direction of Superintendent of Utilities, John C. Herter. Matters of policy are determined by Mayor C. W. Beckstrom and the eight-man City Council.

### List of Equipment

Air Filters—Two American, American Air Filter Co., Inc.

Alarm Panel on 1,200-hp. Unit:

Panel—Paul Loomis.

Gauges—Ashcroft.

Pyrometer—Alnor, Illinois Testing Laboratories.

Alternators—Fairbanks, Morse & Co.

Batteries—Exide.

Compressors—Fairbanks, Morse & Co.

Cooling Water Tower—Diesel Service.

Engines—Four Fairbanks, Morse & Co.: One 360-hp. F.M.; one 6-cylinder, 450-hp. Model 32E14 F.M.; one 4-cylinder, 700-hp., Model 33F16 F.M.; one 6-cylinder, 1,200-hp. Model 33FD16 F.M.

Exhaust Silencers—Maxim Silencer Co.

Fuel Oil—32 to 36 gravity diesel fuel, Texaco.

Fuel Oil Filters—Wm. W. Nugent & Co., Inc.

Fuel Oil Meter—Neptune Meter Co.

Fuel Pump—Viking Pump Co.

Lube Oil—Sinclair Gascon D, Sinclair Refining Co.

Lube Oil Cooler—Ross Heater & Mfg. Co., Inc.

Lube Oil Filter—Purolator Products, Inc.

Lube Oil Pumps—Geo. D. Roper Corp.

Reclaimer—For smaller units, Youngstown Miller.

Switchboard—Westinghouse Electric & Mfg. Co.

Voltage Regulators—Four Silverstat Regulators.

Water Pressure Alarm—Mercoid Corp.

Water Pumps—Fairbanks, Morse & Co.

Exhaust gases for the 700-hp. and 1,200-hp. engines vent through Maxim silencers. Behind the silencer at left can be seen the brick air chamber which houses two 9-element American air filters.



# TWIN STEEL DIESEL SHRIMPERS

**Two of a Fleet of Steel Diesel Shrimpers for Mexican Operation**

By CHARLES F. A. MANN

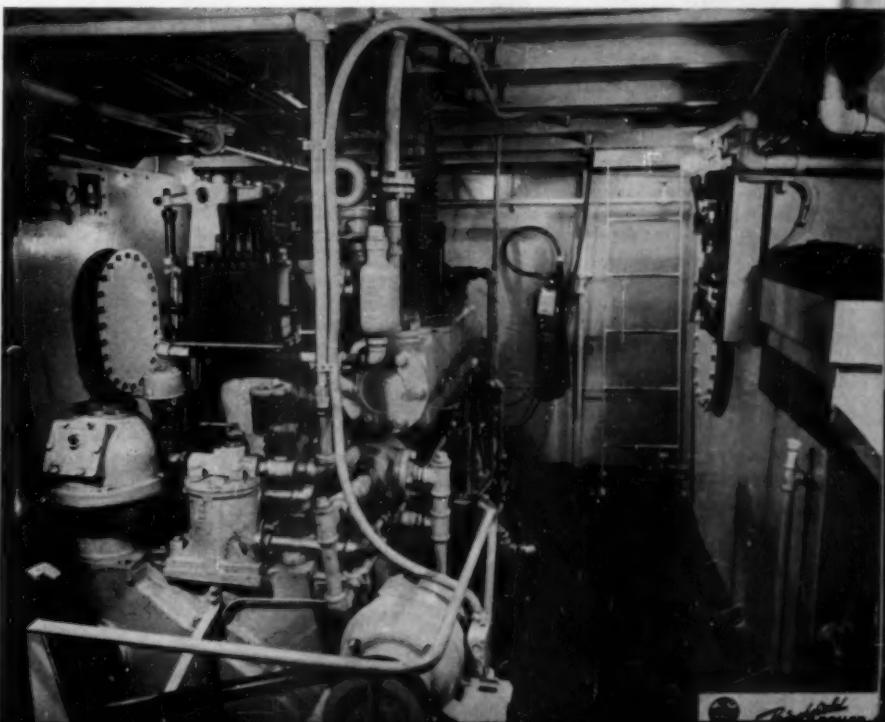
**L**EAVE it to one of the West coast's "glamour boys" in the steel fabricating, boiler building, boat building and commercial fishing industries to upset tradition by building twin little diesel shrimp boats way up north in the land of stout Douglas Fir hulls for use way down south in Mexican waters! Early in November the second of a pair of twin welded steel shrimpers left the plant of Birchfield Boiler, Inc., at Tacoma, for southern waters, while Birchfield's imaginative, energetic owner, T. A. (Al) Davies chewed up a whole box of lengthy cigars and smiled as he mentioned another and even longer steel fishing vessel—a 140-footer soon to be launched at his Tacoma shipyard on sub-contract for another Tacoma fishing vessel builder. Between cigars and things and ships fabricated from steel, Mr. Davies commutes to Peru by air, where he has extensive fishing interest in co-operation with prominent Peruvian people.

The two vessels, the *Miramar* and the *Carmelita II*, were the result of arrangements concluded by Cecil Drake, widely known fishing industry factor. Both vessels are 100 per cent welded steel and built low in the water to operate economically with moderate power and make long runs back to port if necessary. Each is 54x16x6 feet overall length, and of 8 net tons each, or about 20 tons iced shrimp carrying capacity. They have insulated cargo holds made up of 4-inch cork blocks cemented directly to the steel and covered with sheet steel and galvanized afterward to eliminate all painting and caulking expense, as well as repairs and repaint jobs. The vessels are each powered with a 90-hp. Washington diesel and drive 3-bladed Coolidge propellers. They carry a small belt driven generator to normally charge the Apex battery set. Each carries fuel oil storage for 2,268 gallons and has a hand-operated steering gear with pilot house and topside control stand—the upper level being merely a small canvas shelter to keep the sun off.

*Carmelita II* carries an 8-hp. Fairbanks-Morse auxiliary diesel which operates a De Vilbiss air compressor and a Curran Root generator. *Miramar* carries a Lister-Blackstone 12-hp. auxiliary diesel, driving an American Century bilge pump, a De Vilbiss air compressor and Curran Root generator. Both carry 100-watt radios,  $\text{CO}_2$  portable fire extinguishing sets and Tyee hand operated deck pumps.



*Carmelita II* identical twin of the D/S *Miramar*, both equipped with 90-hp. Washington diesel and both built by Birchfield Boiler, Inc., Tacoma, Wash.





By MICHAEL P. SIROFF\*

## MUFFLER TYPES

THE muffling of exhaust gases from stationary internal combustion engines has progressed a long way since the early days when a part of the job of a foreman installing the engine was to fabricate a muffler for it. He would use the material on hand and would apply all his best knowledge and ideas. Seldom do we see nowadays the concrete pits filled with rocks or cinders that would create a devious path for exhaust gas flow, and thereby would silence the noise at an expense of a back pressure, or the restriction type muffler which was also so extensively used in the automotive field. Here the exhaust gases would be made to pass through a series of baffles or perforated chambers. The trouble encountered with this type of muffler was that in order to be effective at a low back pressure its size would have to be made unduly large.

The introduction of the multi-cylinder, high speed, two cycle engine with its inherent sensitivity to excessive exhaust-line lengths, greater exhaust volume per unit horsepower due to scavenging, and the peculiarities of its exhaust sound has created new problems for the muffler designer. Mufflers which were performing satisfactorily on four-cycle engines were found to be inadequate for those of two-cycle type. These were probably some of the reasons why we find that during the last decade more time and effort has been put in muffler research than at any other time before.

\*Design Engineer, Manufacturing Division, The Fluor Corporation, Ltd.

If we analyze the construction of present mufflers for the stationary internal combustion engine, we will find that as far as the problem of sound attenuation is being concerned, almost all of them are designed on the basic principles of acoustics. Any muffler, in addition to being a good silencing device, must be designed to perform all of the following functions: (a) to eliminate pulsative waves set up in the exhaust gases by the reciprocating motions of the power pistons; (b) to meet the minimum pressure drop requirement as set by the engine manufacturer; (c) to discharge the exhaust gases to an elevation where they will not be harmful to surroundings or to persons; (d) to combine all the desirable performance characteristics with those of design uniformity, parts interchangeability and the production economy.

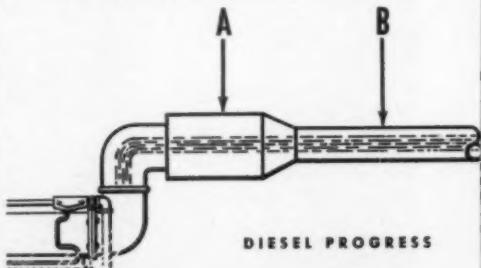
*Pulsations in Exhaust Gas Stream.* Poorly designed and improperly located mufflers have an adverse effect on the engine performance due to the presence of pulsations in exhaust gas stream. The exhaust pipe extending from the engine exhaust manifold to its connection with mufflers has a definite resonant frequency, depending on its length and the temperature of the exhaust gas. If the fundamental resonant frequency of this pipe is equal to that of the fundamental frequency of the engine, the trouble will result with almost all certainty. In order to eliminate the possibility of this occurrence, certain empirical formulae have been developed by use of which one can calculate the safest length of the exhaust pipe for each engine.



Figure 2. El Paso at Gila Bend Compressor Station Big Inch Line—East Texas to California.

The best solution in such cases would be to design a muffler that would eliminate the gas stream pulsations as well as silence the exhaust noise. The application of such muffler would be especially desirable for two-cycle engines of crankcase scavenging type which are quite sensitive to pulsations and high back pressures. One of the developments in the design of modern mufflers that has come out in the recent past is one of the dual system of muffling. As can be seen from Figure 1, the system consists of three component parts: high frequency attenuating chamber (A), properly sized exhaust pipe (B), and a low frequency attenuating chamber (C), usually located outside of the engine room. The advantage of this system lies in the fact that it can be so designed as to perform a double function, that of pulsation dampening and of sound attenuation. When properly designed, this system will eliminate the danger of reflections and conditions of resonance in the exhaust pipe, thereby permitting the installation of the second chamber at any distance from the engine. The physical dimensions of the system's component parts will vary with the cut-off frequency desired and the maximum back pressure allowable. One of the typical installations of this system is shown in Figure 2.

*Back Pressure.* The magnitude of back pressure created by a muffler has a definite bearing on the performance of the engine; however, there is a great difference of opinion amongst engineers and engine manufacturers as to what is the proper back pressure. We know that in the automotive field mufflers can be designed for a much higher back pressure than in the stationary engines, the average being about six inches of mercury for the quiet type. We also know that two-cycle stationary engines, especially those of "crankcase scavenging"



type, are very sensitive to high back pressure which represents lost work and decreased efficiency, and we, therefore, find that the average design pressure drop for mufflers on stationary internal combustion engines lies between four and ten inches of water. It should be pointed out that mercury or water manometers do not always give the complete and true picture of the back pressure. The presence of pulsations in the exhaust gas flow makes it extremely difficult to find what the real magnitude of the back pressure is. This may be further complicated if reflections and stationary waves are present. Probably the best way to get a reliable data is to use one of the specially developed instruments known as electrical differential pressure indicators.

**Standard Mufflers.** Since it is economically undesirable for a muffler manufacturer to design a muffler for every stationary internal combustion engine on the market or in the field, he usually resorts to the establishing of a line of "Standard" mufflers. Each unit of this line is then so designed as to cover a certain range of engines depending on their horsepower ratings, type of fuel, number of strokes, speeds, etc. The number of units in a line may be anywhere from sixteen to more than twenty. In the dual system of mufflers described previously, fitting of an engine with a proper muffling system is made somewhat easier than with the ordinary muffler. Since the dual system consists of three component parts (two chambers and the exhaust pipe), the designer has a number of combinations or standard parts from which he can select a most effective combination for a given engine. Some muffler manufacturers offer more than one of "Standard" lines of mufflers. Usually one of these is designed to do a better silencing job than the others, and is offered for such installations as hospitals, hotels, and residential districts where quiet is maintained. Other manufacturers treat such installation as special cases and usually design a muffler or a muffling system to meet the requirements.

**Types of Mufflers.** All mufflers, whether of single unit type or of dual system type, used on station-

ary internal combustion engines, may be divided into two general classes: air-cooled and non-air-cooled. In order to better fit into engine house layout, each of these mufflers may have an exhaust inlet located either at the bottom or on the side. Thus we have: (1) bottom inlet type; (2) side inlet type. The later type may have exhaust inlet flange located at the top of the shell or near the base plate. The air-cooled mufflers shown in Figure 3 and 4 are used extensively in petroleum and natural gas industries as well as in marine engine installations. Their main advantages can be summarized as follows: (1) they provide a positive induced draft ventilation of engine room; (2) they reduce the temperature of muffler shell and exhaust pipe, thereby greatly prolonging their lives; (3) they eliminate the necessity of lagging and inherent possibility of burnouts under it; they reduce the final exhaust temperature.

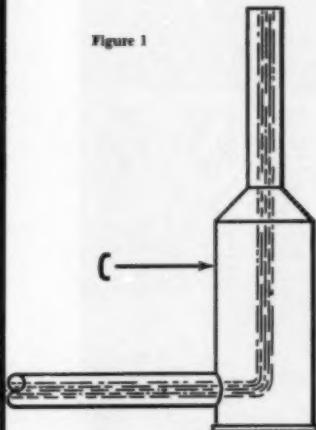
The quantity of air educted by an air-cooled muffler depends on many factors, such as the air resistance of the ventilating system, nozzle and throat design of mufflers, engine load, engine speed, etc. Actual performance tests in marine installations with large diameter air ducts have recorded air draws in ratios by weight of six parts of air by one part of exhaust gas. In ordinary compressor house installations there is usually no need for such high degree of ventilation and air-cooled mufflers are designed for draws of one to three parts of air by one part of exhaust. Number of air changes effected by air-cooled mufflers varies from ten to fifteen per hour, depending on design of ventilating system. The non-air-cooled mufflers are designed for the same sound muffling efficiency as the air-cooled ones, and their application is reserved for those installations where engine room ventilation is not an important consideration. These

mufflers are mostly of bottom inlet type and are especially adapted for vertical installations.

There are various special types of mufflers that are being used on stationary internal combustion engines. Of these we shall mention: (1) spark arrestor-mufflers; (2) heat economizer-mufflers; (3) waste heat boiler-mufflers with or without spark arresting features. In fire hazardous areas, such as oil refineries, or where dirt nuisance is not tolerated, spark arrestor mufflers are being used. The spark arresting element is usually a single cyclone unit around which a muffler proper is built. Properly designed cyclone units usually have efficiency of ninety-five per cent or higher without sacrificing the silencing property of a muffler.

Heat economizing mufflers are just a variation of an air-cooled muffler mentioned previously and are used for heating engine houses during cold months. Figure 5 illustrates one type whereby outside air is circulated around the hot muffler shell and exhaust pipe by means of a blower, and then is discharged into the engine room. Hot air bypass and damper device are usually required to control the temperature of hot air entering the room. Waste heat boiler-mufflers are designed to utilize the exhaust heat for generation of steam or hot water. Heat transfer rates are greatly improved by high mass velocities and extension of heating surface. Installed on four-cycle diesel engine for generation of 30.0 psig. steam, approximately .75 pound of steam per brake horsepower were developed according to reports.

Figure 1



JANUARY 1951

49

Figure 4. Air-cooled side inlet dual-type muffler.



Figure 3. Air-cooled bottom inlet dual-type muffler.

Figure 5. Heat economizer dual-type muffler.



# LARGE PORTABLE DIESEL SETS

By F. HAL HIGGINS

THROUGHOUT the world there has been an increasing demand for large portable diesel generating sets to take care of emergency requirements pending the erection of a permanent power plant. This type of equipment is usually described as a portable plant incorporating all of the necessary components required in any stationary plant of equal size and capacity but must provide for a flexibility of operation which is not practical with a stationary plant. It must be literally a "Central Station" in itself, independent and self-contained.

The idea or basic design of large portable power plants of course had its inception during World War II when the United States Army had a great number of them manufactured for use in the invasion of the Continent. Later on after the war was over, the design characteristics of the Army units were further developed some three and a half years ago by A. G. Schoonmaker Company Inc., under the guidance of W. E. Skinner, who is an old hand on equipment power and refrigeration problems. The Mexican Federal Power Commission, some four years ago, were in the market for some diesel portable units and these were needed to furnish power for utilities, municipalities, and industrial plants in Mexico during various emergency periods caused by floods, breakdowns of high line facilities and other reasons. The most important features specified by the Mexican Federal Power Commission for these portable diesel units were the following: (1) portable units which could upon arrival be immediately assembled with the least possible expenditure of labor and requiring no foundation or mats; (2) portable diesel units which could be transported either by truck or by narrow gauge

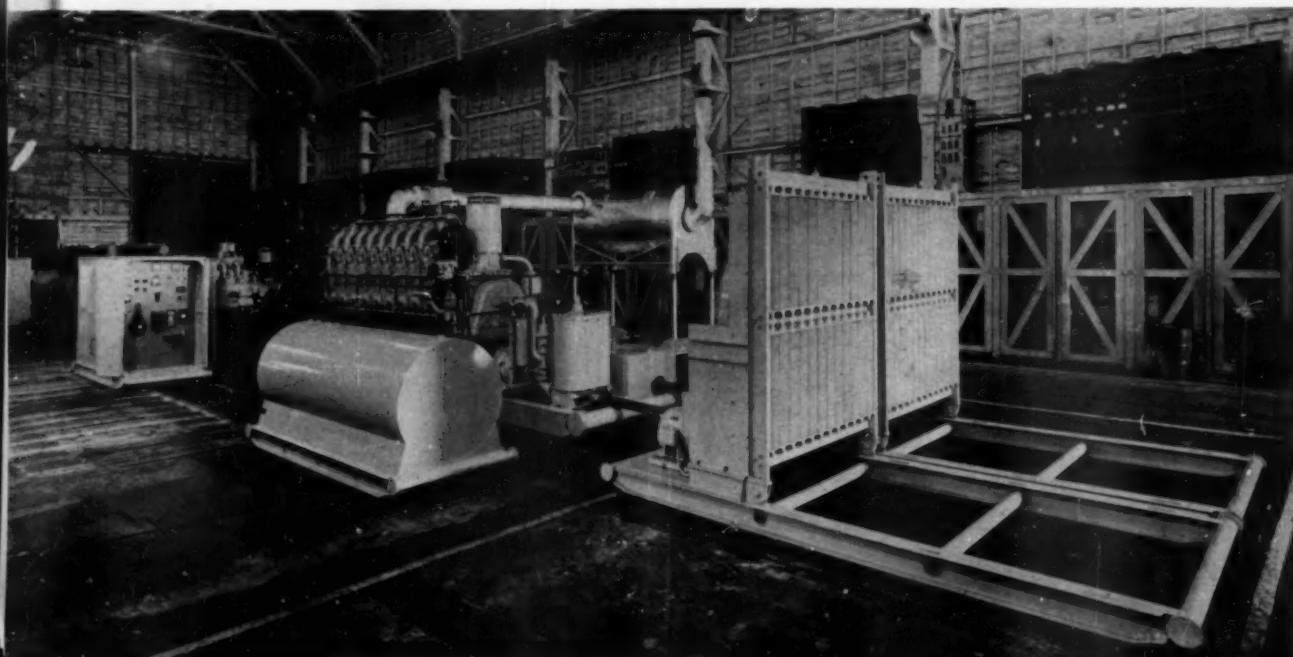
railroad with limiting restrictions of height, width, and weight; (3) portable units which could provide continuous heavy duty service with fuel and lubricating oil economies equaling that of stationary equipment.

The A. G. Schoonmaker Company, Inc., designed and manufactured such portable diesel units for the Mexican Government incorporating all of these features. A number of these large units have been in service in Mexico for the last three years and a repeat order has recently been placed for more of them.

Recently at the Schoonmaker Sausalito Plant in California a test set was shown to a group of interested power experts and the illustrations here-with feature that particular job. The prime mover consisted of a General Motors 16-278A diesel engine rated at 1,600 hp. direct connected to an Electric Machinery Manufacturing Company's generator. The engine and generator are mounted on a common steel sub-base which incorporates several very interesting features. This engine, which, of course, is a Cleveland diesel, operates at 720 rpm. for 60 cycles—600 rpm. for 50 cycles.

Some of the outstanding features of this unit as it was seen at Sausalito were as follows: (1) Built-in screw jacks to raise the engine for insertion of specially designed wooden shipping skids, whenever the engine must be removed from the main base for shipping and handling purposes (this is only necessary where transportation, height limitations, or weight limitations are a factor). (2) The engine is connected to the generator through a special flexible coupling designed and manufactured by Thomas Coupling Company. This

coupling makes it possible to disconnect the engine from the generator without disturbing alignment. (3) The generator is designed with a long shaft to permit shifting of the stator to simplify any field repairs which might be necessary. (4) The lubricating oil assembly which is mounted at the engine end of the main engine generator assembly incorporates the sump tank, lubricating oil filter, strainer, and cooler. This lubricating oil assembly is connected to the main engine generator assembly by a unique arrangement that provides for reasonable flexibility while at the same time securely holding the two skids together. (5) Two radiators are individually skid mounted. The Young radiators are attached to the skids by means of a pin hinge so the radiators may be folded down, thereby saving space and protecting the radiators during shipment. On one of the two radiator skids, a Fulton Sylphon thermostatic control valve is provided to maintain constant jacket water temperature to the engine. In operation the two Young radiator assemblies are placed in front of the lubricating oil assembly and the cooling water piping runs directly from the main engine generator assembly through the lubricating oil assembly to the radiator assembly. Flexible pipe connections are provided between all assemblies. (6) The operating fuel is stored in a skid mounted 1,000-gallon tank, which is sufficient to handle the fuel requirements of a single unit for approximately 24 hours. If the fuel arrives on location in drums, provision has been made for forcing the fuel from the drums into the fuel tank by means of low pressure compressed air from the starting air skid. (7) A starting air assembly consists of two air tanks with an air-cooled air compressor mounted on top of the tanks driven by an electric motor or alternately by a gasoline



engine. (8) The muffler assembly consists of a dry-type industrial silencer mounted on a skid in a manner that permits the muffler to be raised to the operating height or lowered to the shipping position. A pin and clamp arrangement holds the muffler in the desired position. Raising and lowering of the muffler is done with jacks. (9) The switchgear assembly consists of a generator and exciter control and synchronizing panel measuring 48 inches wide, on which are mounted the necessary instrument meters and switches, including oil circuit breaker and voltage regulator. The switchboard is enclosed in a metal cabinet and the operating control panels are accessible through double-front doors. The rear of the panel, which is accessible through a single swinging door, contains the primary power equipment, which also includes a 50-kva, 3-phase house service transformer, lighting transformer, and fused switches that control the leads to the lights, compressor motors, and radiator motors.

There are, of course, many applications for large portable diesel units of this kind. The military requirements are obvious and even serve as a temporary or semi-permanent power supply for the concentration of troops and facilities. In the case of operations where rehabilitation of an area is delayed due to lack of sufficient power, a portable unit of this type furnishes power to such devastated areas almost immediately with a minimum amount of time and labor and with practically no preparation at the site of operation.

Utilities and municipalities that have a load out near the end of a long line have found that this type of portable equipment is very well suited to be set up out at the end of such a line, when that line had to be shut down for repairs or relocations. It also provides power at a central station following failure of other generating equipment. In the case of hydro-electric stations that because of low water, or dam repairs, cannot furnish sufficient capacity for all requirements, these portable diesel units are of material assistance. In the case of industrial and construction repair requirements where the equipment has to be installed permanently or semi-permanently, this type of equipment has several very distinct advantages: (1) Immediate installation with no major foundation or construction costs or problems. (2) Minimum disruption of any operation in the plant due to this portable installation. (3) Easy maintenance and repair. (4) Advantage of the later high resale value.

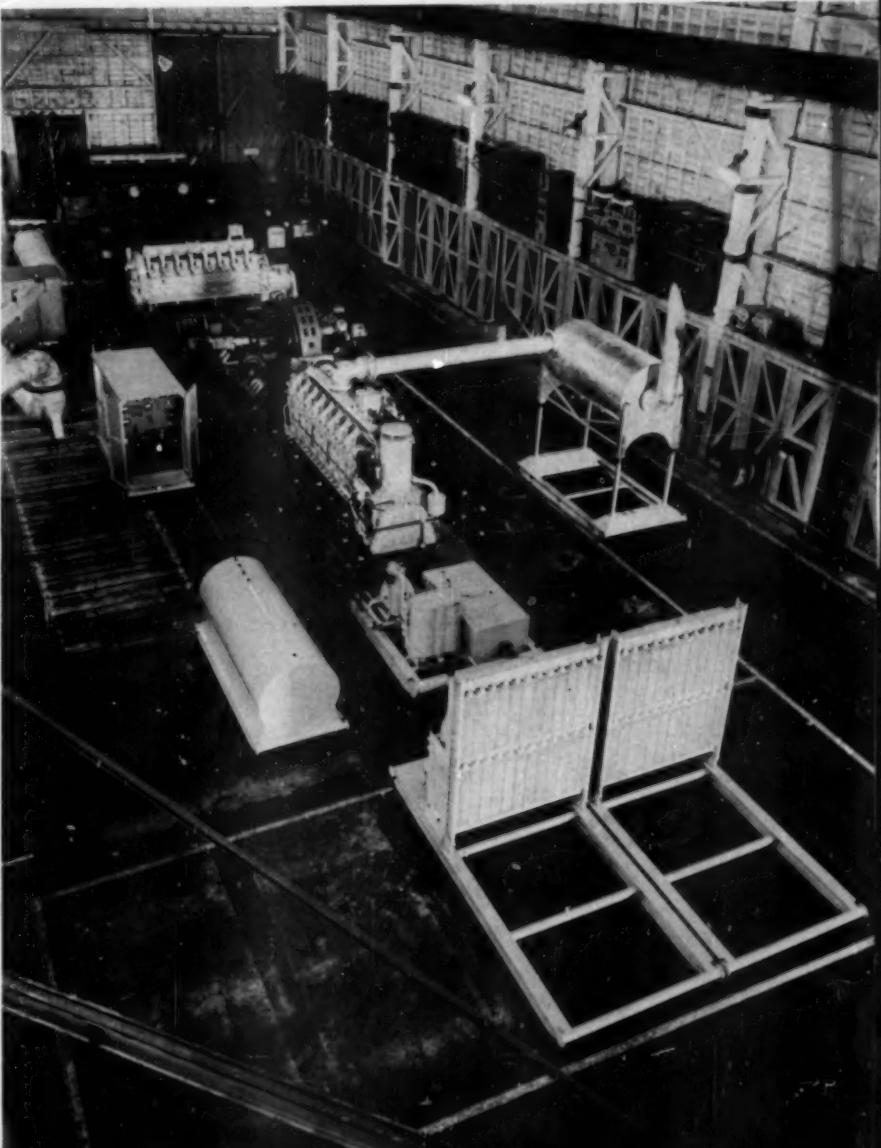
The ingenious manner in which Mr. W. Skinner and his associates have developed this large 1,600-hp. portable diesel unit was very evident at the Sausalito Plant, when this particular unit was on test. Each assembly is easily broken apart and is not too heavy for field handling and each sub-assembly is easily put together in the field by means of flexible hose connections or Thomas flexible couplings. The fuel air tank and switchboard units are integral and can be mounted on the field in the most convenient location. Here below we are listing the shipping weights, dimensions and cube of this 1,600-hp. portable unit to show just how it breaks down into practical weight and cube limitations.

#### Shipping Weights, Dimensions and Cube

	Outline Dimensions	Weight	Cube
Generator and Main Skid	38 x 7 1/2 x 7 feet	41,000 lbs.	1,525
Engine and Shipping Skid	17 x 4 x 8 1/2 feet	34,000 lbs.	799
Engine-Generator-Main Skid	38 x 7 1/2 x 10 1/2 feet	75,000 lbs.	2,324
Lube Oil Skid	9 x 7 1/2 x 6 feet	4,600 lbs.	416
Muffler Skid	12 x 6 1/2 x 9 1/2 feet*	5,280 lbs.	279
	11 3/4 feet**		
Radiator Skid	15 x 7 x 5 feet* 10 feet**	5,000 lbs.	588
Radiator Skid	15 x 7 x 5 feet* 10 feet**	5,000 lbs.	588
Starting Air Skid	7 1/4 x 3 3/4 x 4 1/2 feet	1,500 lbs.	95
Switchboard Skid	10 1/2 x 4 1/2 x 7 1/2 feet	7,600 lbs.	370
Fuel Oil Day Tank Skid	11 x 4 1/2 x 4 1/4 feet	2,320 lbs.	252
		106,500 lbs.	4,912

\* Height in Lowered Position.

\*\* Height in Raised Position.





# Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

## MORE MAINTENANCE PROBLEMS

**D**UE to economic conditions we are again facing a period of short supplies and long deliveries on certain required items for diesel engine operation. Such a condition existed in World War II and from all indications we will probably go through such a period again. That probably accounts for several letters received recently by this department on various phases and methods of maintenance. The boys are having to resort to repairing instead of replacing certain unit parts.

One such letter received from a reader we quote in part: "During the past couple of years we have added two diesel units to our plant equipment. Our plant mechanics are not too familiar with this type of unit and consequently we would like a little advice on the periods of inspection, methods of maintenance and general advice on our fuel injection equipment, particularly the nozzles. Would it be better for us to try and maintain this equipment or send it to the builder for overhauling? We rather hesitate to tackle the job with our limited knowledge, until such time as we become more familiar with it. To date we have had some trouble but as our loads increase and the units operate at longer hours, we sense that we may run into further difficulties. Your comments would be appreciated."

This is a very logical request on the part of our reader. Fuel injection equipment and the proper condition of the nozzles does play an important part in the economic operation of any unit, and we can readily understand why mechanics and operators not thoroughly familiar with this equipment would hesitate to tackle a maintenance job, especially one of this nature, until they are familiar with it. However the only way to learn the technique is by doing it under proper supervision. Since much depends on the proper condition of your fuel injection equipment and nozzles, probably your best bet would be to have a representative of the vendor of that equipment, who is thoroughly familiar with its functions and the maintenance of the equipment, come to your plant and instruct your mechanics on all points pertaining to the equipment. By no means would I advise a novice to tackle the job of repair and maintenance of such equipment. However, once he has been fully instructed and apprised of the methods and important points of maintenance, a good mechanic should have no difficulty in keeping this equipment in proper working condition.

"The periods of inspection depend on several factors, such as hours of operation, load demands, type of fuel and lubricants employed, etc. If all conditions are right, so that you can spare the unit once a month for an inspection of these parts, advantage should be taken of this outage to make the inspection. Now some engineers will say that this is not necessary. Perhaps in some instances it isn't, but we work under the theory that too much inspection is a lot better than too little. We get right back to the old "Preventive Maintenance" theory; prevent your troubles, rather than try to overcome them after the damage has been done.

All of us are experiencing increased loads and the load demand is constantly creeping upward. In our particular plant the load demand has increased approximately 13.6 per cent over last year, which was our biggest year of generation. This is a situation which is facing nearly every plant today and is still far below the generating conditions of the country as a whole. Now what does this mean? It simply means the operation of the units for longer periods each day, the handling of higher peak loads. At the same time we are faced with poorer fuel than we have had in years past, that is we are not receiving the type of fuels we had a decade ago. Lubricants should be improved over those of a decade ago. But we still find that a monthly inspection of the fuel injection equipment, cleaning and adjusting of the nozzles and nozzle pressures is most advantageous.

Another communication on the subject of bearing troubles is quoted here, in part: "For some unaccountable reason we have been bothered lately with bearing failures. We have delved into the matter from every angle, lubricants, bearing metals, clearances, etc., but we still have trouble. Can you give us any plausible cause for this?"

That in itself is quite an order, the writer not knowing of plant conditions. But one thing he has noticed is that there has been an excessive amount of crank and main bearing troubles during the past few months. Possibly there were just as many bearing failures a few years ago in proportion to the diesels in operation but it does seem that we have heard of more cases lately.

There may be several reasons for more frequent bearing troubles, of late, some of which may be

mechanical faults, others due to plant personnel methods and some of them may be traceable to lubricants, to failure on the part of the manufacturer to follow the proper method of cleanliness in manufacturing procedure, etc.

Right now we are in a period of more or less mechanical instability, one might say. The old time mechanic who insisted on perfection in all his work is fast becoming a thing of the past. Yes, we do have them, some of them, but the rising generation are not for the most part, the mechanic of that type. They are not to blame for this in its entirety. Production methods are all based on a hurry-up schedule, get the stuff out without delay. I was recently talking with a representative of a large diesel manufacturing company and his one complaint was right along this line. Many of the parts of their units today are jobbed out to concerns who actually do not have the "know how" of turning out such parts. When the parts are received at the plant they are assembled on a production basis and proper care is not exercised in assembly. The units may be built to the designers specifications, but somewhere along the line the old "fineness" is missing. It may be in the pouring and machining of the bearing shells, or even in taking time to get the proper tolerances on the bearing. One instance is called to mind where a connecting rod bearing wiped. It was removed, the shaft which had been slightly scored was honed to what the mechanic thought was satisfactory. A new bearing shell was fitted and the whole reassembled. The unit was started up and after three hours operation the bearing again failed. Inspection proved that in honing the shaft, the mechanics had not followed up the honing with the customary finishing with crocus cloth. In addition to this the new bearing did not have suitable tolerance and under load stress, it failed.

There are a lot of other factors that enter into bearing failures but a discussion of these will be taken up in next month's issue as space will not allow for a complete discussion in this issue.

Let us have your comments on this problem: One of our readers has written as follows: "We are in the process of designing a new water pumping station. We contemplate using diesel engines directly connected to pumps in this station. How-

...and now please turn to page 61...

# TEMPORARY LULL IN TUNA CLIPPERS ENDS WITH DIESEL POWERED "MONDEGO"

By CHAS. F. A. MANN

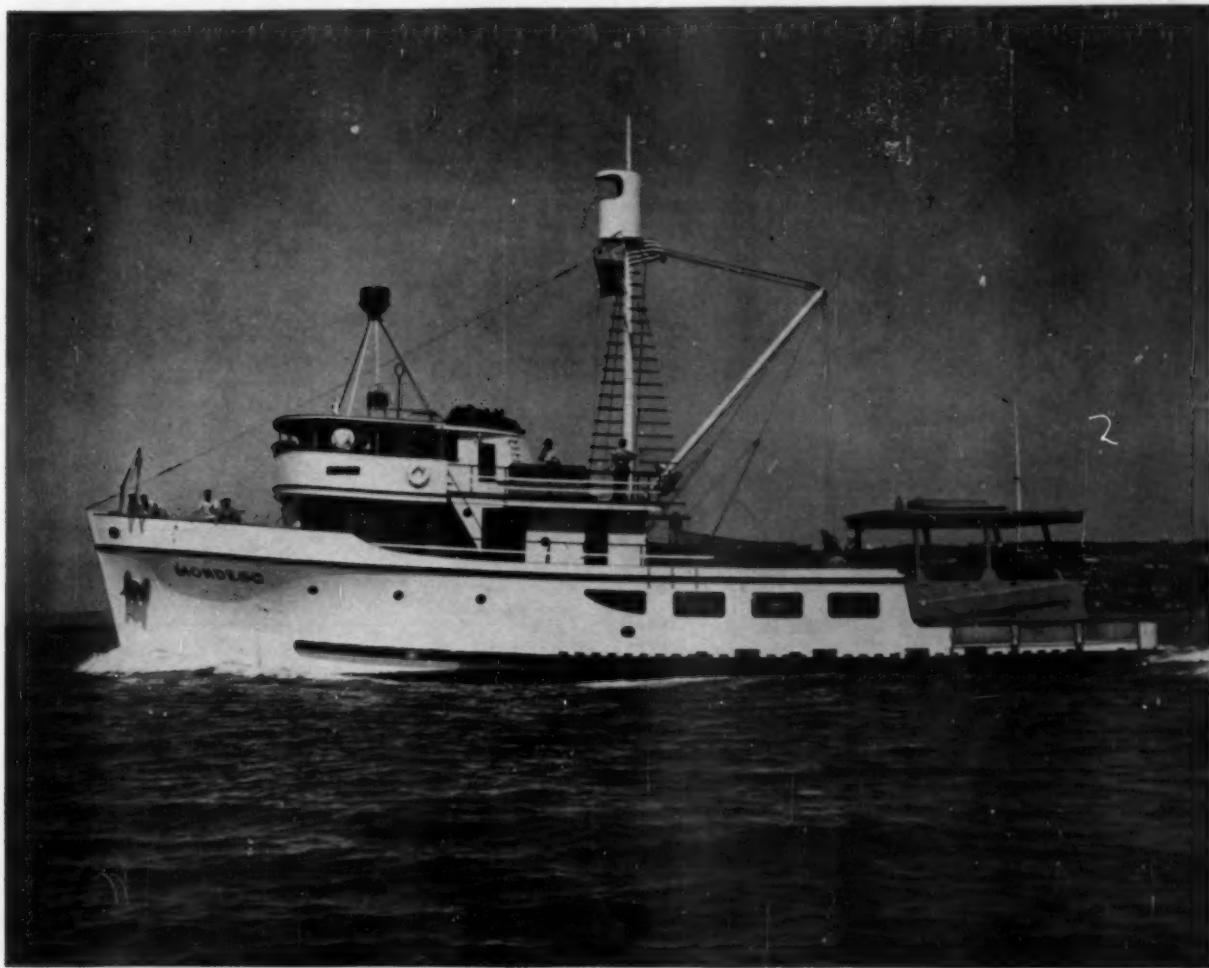
WITH sixteen Tuna Clippers of the Pacific Fleet lost, wrecked, strayed or stolen—or otherwise marked off as "sold to the insurance brokers," in the past year, the much-feared folding of the Tuna Clipper construction machinery in the Pacific Northwest turned out to be groundless. In 1949 everybody foresaw cobwebs over the shipyards and rust and peaceful dust in the diesel machinery plants by the summer of 1950. A few wise boatbuilders started a few clippers on "spec," but no firm orders. Within 60 days after the Korean situation broke, northwest yards were filling up with orders and the very end of war surplus diesels in large sizes came and went. . . .

After the current orders are filled, new diesels will be the rule, instead of the exception.

First Tuna Clipper from Tacoma was the *Mondego*, from Puget Sound Boat Building Corp., from the boards of James J. Petrich. *Mondego* is 104 feet by 25 feet 6 inch beam and 13-foot depth, and is of the heavy Douglas fir, mahogany and poplar trim construction, with fine lines and streamlined stack, pilot house shelter and other gadgets. Main propulsion is a 440-hp. Washington diesel engine which gives 10 knots speed. Below decks are eight refrigerated fish tanks for the frozen tuna, plus a three-unit refrigerated deck

box for bait and tuna, giving her a total of 190 tons capacity on the inbound voyage. Refrigeration is supplied by three 5x5 Baker ice machines located on the main deck.

Auxiliary power is supplied by two 160-hp. General Motors diesels driving 75-kw. generators and a full battery of Jacuzzi pumps are fitted for fire, bilge, and brine circulation. She has an elaborate radio and navigation equipment layout, including a Fathometer, Intervox direction finder, photo electric pilot and Pacific Electronics radio. Crew's quarters for eleven, plus the captain's quarters, all located on the raised deck.





## WHAT'S GOING ON IN ENGLAND

CONDUCTED BY HAMISH FERGUSON

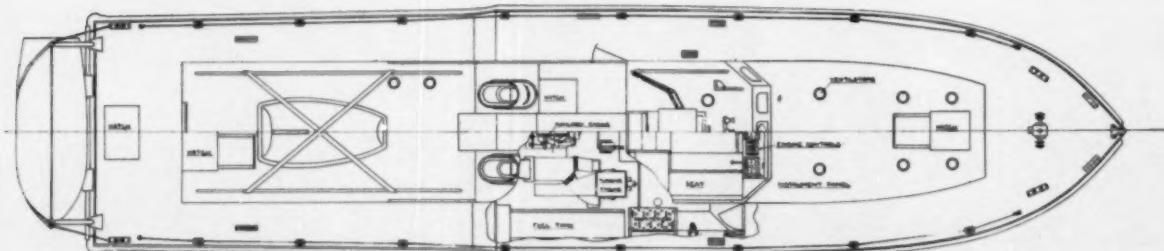
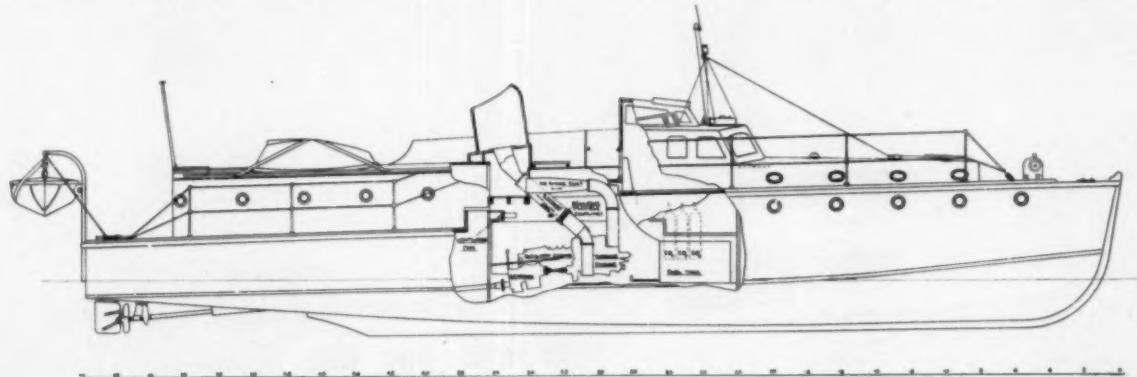
Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr Ferguson continues to do independent consulting work.

THE Rover Company's gas turbine is now being developed for general use in the range of 100 to 200 hp. It is intended for both marine and transport work where a reasonably light-weight compact unit is required but where the low fuel consumption of a diesel is not necessary or is outweighed by the ability of the unit to burn a variety of fuels. The turbine unit was first fitted experimentally in a car and has been successfully demonstrated both on the road and the racing track. As the next step, two T8 units have been fitted in the company's 60-ft. launch *Torgoil* and demonstration runs were given for the benefit of the press and others interested. It is made clear that the problem of high fuel consumption has not yet been resolved but the theoretical limitations are fully understood and the solution lies in the design and incorpora-

tion of efficient heat exchangers which are now in the course of development. In the meantime, fuel consumption is around 1.6 pounds per brake horsepower hour at 100 hp. output. It is anticipated that with suitable heat exchangers the specific fuel consumption will be reduced to 0.8 pounds per brake horsepower hour. The units at present installed in the launch are limited to 100 to 120 hp. each for continuous running, but it is hoped that this output will be increased to 180 to 200 hp.

The turbine unit consists of the following components in the order of air flow: *Compressor*—a single stage centrifugal compressor, similar to an aircraft engine supercharger, is used. This has a single-sided impeller and runs at a maximum speed of 40,000 rpm. *Combustion Chambers*—Fuel is burnt

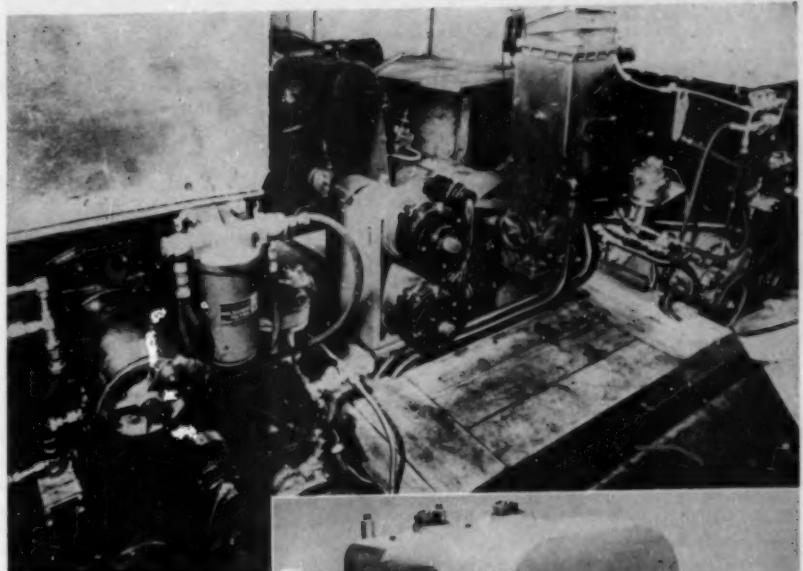
in two combustion chambers similar to those used on an aircraft jet engine. This heats the air to the temperature required by the turbine. *Compressor Turbine*—From the combustion chambers the hot gases pass to the compressor turbine. The turbine rotor is machined from Nimonic 90 forging complete with blades and is used to drive the compressor impeller and all auxiliaries. It is not mechanically connected to the output shaft, which is driven by a separate turbine. *Power Turbine*—Mounted behind the compressor turbine is the power turbine. This is similar to the compressor turbine but has somewhat longer blades and runs at a maximum speed of 30,000 rpm. *Turbine Exhaust*—From the power turbine the exhaust gases, after having their velocity somewhat reduced in a diffuser, flow to the exhaust. *Reduction Gear*—



The output shaft is driven through a 7:1 reduction gear giving a maximum output shaft speed of something under 5,000 rpm. Ground helical gears are used with oil or jet lubrication and the power turbine is mounted on the end of the high speed pinion shaft. All auxiliaries are mounted on end of unit and driven from the compressor turbine.

They are as follows: *Starter*—A normal car starter is used with a step-up gear of 3:1. *Generator*—A pulley is provided for generator drive, running at 6,000 rpm. *Oil Pump*—This is of the gear type and supplies oil to all bearings and gears. *Fuel Pump*—The fuel pump on the auxiliary drive case supplies fuel to the two burners which are controlled by a spill throttle control. The use of a separate power turbine gives the engine exceptional flexibility, the static torque being about three times the full power, full speed running torque. Control is entirely on the fuel flow, the amount of fuel fixing the compressor turbine speed and hence the power output, independently of the power turbine speed. The power unit weighs approximately four hundred-weight complete, equivalent to 2.5 pounds per hp, including all accessories, and measures approximately 2 ft. 6 in. wide, 2 ft. 6 in. high and 4 ft. long. The output shaft from the power unit is connected by a Cardan shaft to a Wilson oil-operated epicyclic gear-box having 3 to 1 reduction. The propeller speed is designed for 1,000 rpm, and thus during the experimental period the power turbine speed is not permitted to reach its designed maximum of 30,000 rpm. During a demonstration trip the absence of noise and vibration was marked as compared with a reciprocating-engined vessel. Acceleration appeared good and maneuverability, using the reverse gears, was fully adequate for service in narrow waters.

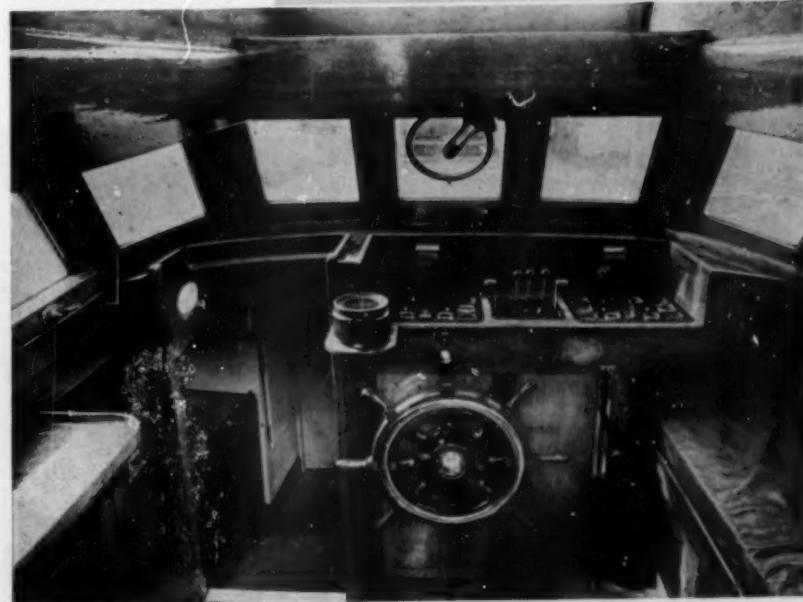
The annual report on Heavy-Oil Engine Working Costs covering the period 1948-49 has recently become available from the Diesel Engine Users Association. The scope of the report steadily increases and a noticeable feature is the gradual disappearance of the air-injection type engine which is being replaced by the more up-to-date and higher speed mechanical-injection designs. It is also noticed that the number of 2-cycle engines included is on the increase, several newcomers being of U. S. design and manufacture. Generating costs continue to rise and a further increase of 3.5 per cent is shown for the home stations as compared with the previous 12-month period. This is partly accounted for by increases in the average costs of fuel and lubricating oil of 6.5 per cent and 8.2 per cent respectively. Wages and materials also continue to become more expensive. However, the operating engineer should be more concerned with improving efficiency—a factor over which he can exercise some control—rather than lose sleep over the cost of commodities which are usually decided internationally. It is encouraging, therefore, to find that the average fuel consumption per kWh generated shows a reduction of 0.35 per cent, indicating speedily improved engine design and greater care in maintenance. It should be mentioned, in this respect, that the higher efficiency has been achieved in spite of the quality of the fuel oil available which tends to deteriorate from the highly refined distillates in that more impurities, particularly sulphur, are creeping in.



Mounting of the two Rover gas turbine engines in the 60-ft. motor launch, *Torquill*.

The Rover T8 gas turbine power unit.

The wheel-house and control panel of the *Torquill*.



# DIESEL PLANT IN ISFAHAN, PERSIA

## Sherkat Sahami Turbine and Diesel Power Plant

By ZAPLETAL AND LIM

Consulting Engineers

**T**O MOST travelers in Persia, the City of Isfahan is known only for its world famous architectural achievements dating as far back as the 10th Century. This ancient capital of the Persian Shahs, crowned with the colored tiled domes of its huge mosques, is now one of the most important manufacturing centers of Persia. Isfahan is a wide oasis situated in the center of desolate deserts, and bordered with high barren mountains. For centuries it was one of the most important crossings of eastern caravan routes linking the Persian kingdom to India, Arabia, Bagdad, Turkistan, China and Turkey. Now the Trans-Iranian Railway passes through the city and a daily airplane service puts it within one hour's flight from Teheran, the Persian Capital. In addition to such old arts and crafts as carpet weaving, silver engraving, miniature painting and pottery enamelling, and the cultivation of grain, rice, cotton and fruits, this town possesses a number of important cotton and woolen spinning and weaving plants equipped with up-to-date machinery. It is often called "The Manchester of Persia." The production of these factories fills a large part of Persia's textile requirements. The industrial development of the City, which started about twenty years ago, has taken a new "elan" after World War II. With the encouragement of the government and through the initiative of able businessmen, the existing factories are being enlarged and new ones built up in order to cope

with the ever increasing demand for textiles in this country. All factories are run by diesel drive, many of them German made machines which although of considerable age are still in operation.

With the growth of the city to more than 200,000 inhabitants the need of an appropriate electrification program became apparent. One of the first projects considered was the building of a municipal power plant. Public lighting and residential customers were wholly dependent upon the power supplied by various factories. To meet the needs of growing industry and to satisfy the public demand a shareholding company was formed by owners and managers of local textile factories. The Turbine Company Ltd., one of the largest private electrical companies in Persia, decided to build a large steam plant which would supply power to the Isfahan textile mills, residential customers, small industries, irrigation stations and municipal street lighting. Since the completion of the steam plant would require considerable time, the company decided to build, as quickly as possible, a new diesel driven plant in order to bring immediate relief to the public. Therefore the Turbine Company Ltd. contracted for equipment made in the U. S. and with the local firm of consulting engineers, Zapletal and Lim, of Isfahan, for plant design and construction.

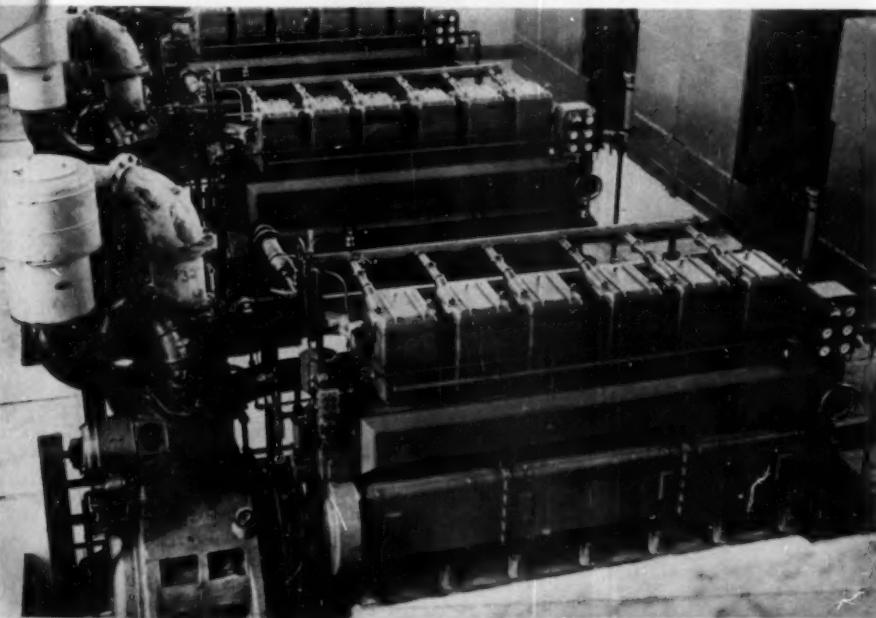
The new diesel plant is now in operation. It in-

cludes three identical 6-cylinder, turbocharged diesel engines, each rated at 865 hp. at 600 rpm. Each engine drives directly a 600-kw., 3-phase, 50-cycle, 400-volt G. E. generator with 7.5-kw. belt driven exciter. The exciter and turbocharger are mounted on the generator, each set forming a compact unit of a short length. Each unit is rated 550 kw. at the altitude of Isfahan. Special foundations were built completely isolated from the ground as well as the rest of the building. The foundations consist of a mat on which insulating cork slabs were placed prior to the pouring of the main blocks. Exhaust pipes are carried out of the building into masonry lined underground silencer pits. Expansion joints beyond the turbochargers, as well as stuffing boxes at the connections of the pipes to the exhaust pits, allow for any required expansion of the exhaust system. From the pits the exhaust passes upward through stacks well above the roof of the building.

The power plant building is simple, modern, high and well ventilated, designed especially for the high temperatures of the Persian summer. The diesel engine jacket water is cooled by evaporative coolers, one for each unit, and the spray water, which contains a great quantity of chalk, is treated in two softeners to eliminate deposit of scale. The raw water tank is located on the roof and fed from a well by two motor-driven centrifugal pumps installed above the machine-room well. Full level of water is maintained by an automatic float type switch. Isfahan, like all other towns in Persia, has neither water piping nor sewerage systems. The fuel oil is stored in an underground steel tank adjacent to the engine room and transferred by pumps into the day tanks located inside the building. Each engine is provided with a full flow oil filter and an oil cooler. Separate switchboards, one for each generator, are placed side by side on an elevated platform and are interconnected by bus-bars. The 6300/400/231 volt transformers are in cells behind the switchgear; current is carried to the town through combined overhead and underground cable system.

The fuel consumption, 240 grammes per kwh., is most satisfactory. The diesel power plant is the most modern installation in Persia. The Turbine Company Ltd. is well satisfied with the operation of the plant and the people of Isfahan look with pride upon this first post-war American power supply. The machinery was manufactured by Worthington Pump and Machinery Corporation and was imported into Persia by E. B. Yaganegi of Teheran.

Three Worthington diesels and three Worthington evaporative coolers in the diesel plant of Turbine Company, Ltd., Isfahan, Persia.



#### List of Equipment

Engines: Three 865-hp., 6-cylinder, 4-cycle, turbocharged Worthington diesels operating at 600 rpm.

Generators: General Electric Co. 600-kw., 3-phase, 50-cycle, 400 volts with 7.5-kw. belt driven exciter.

Superchargers: Elliott Company.

Air Filters: Air Maze Corporation.

Jacket Water Circulating Pumps: Worthington.

Water Softeners: Calgon Inc.

Raw Water Pumps: Worthington.

Governor: Woodward Governor Company.

Lube Oil Filters (Engine): Cuno.

Lube Oil Filters (Turbochargers): Nugent.

Lube Oil Coolers: Ross.

Fuel Oil Transfer Pump: Worthington.

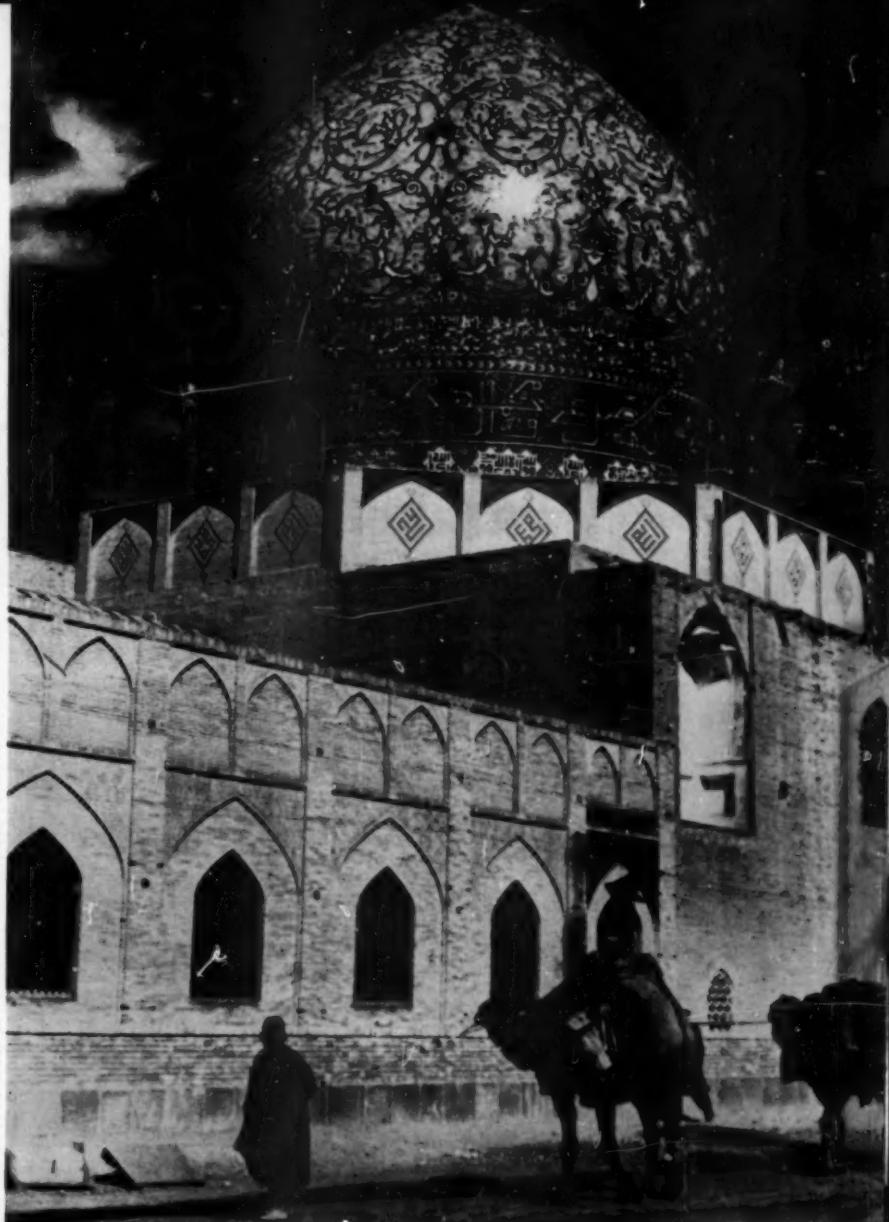
Alarms: Viking Instrument Company.

Pyrometers (Alnor): Illinois Testing Labs.

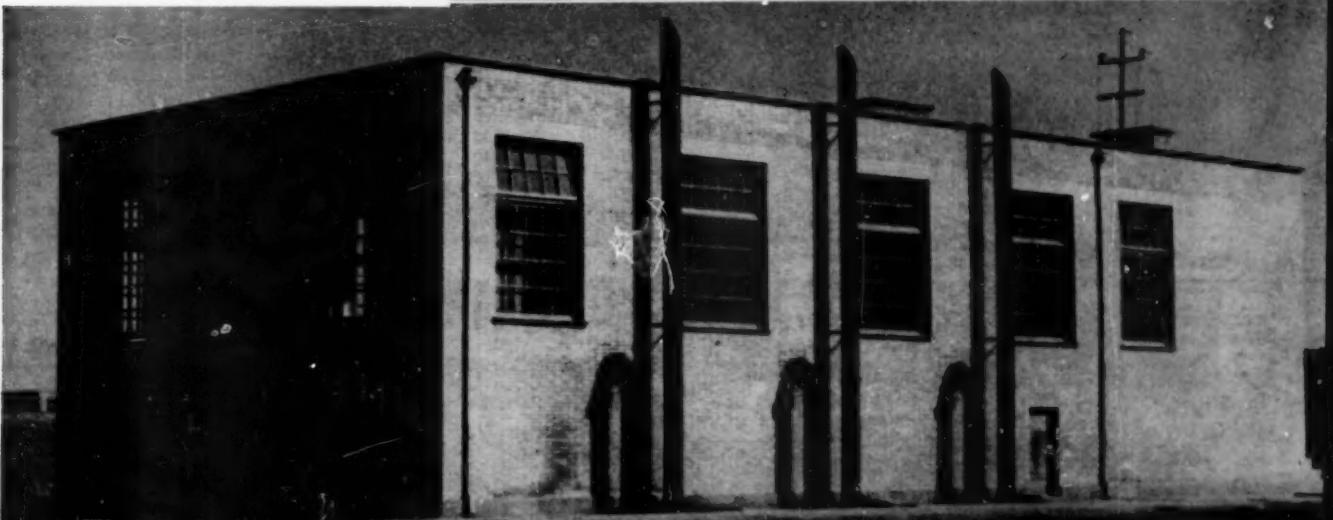
Starting Air Compressors: Worthington.

Switchboards: General Electric Co.

One of the beautiful Isfahan Mosques.



Exterior view of The Turbine Company, Ltd.'s, Isfahan diesel plant.



**Belfast & Moosehead Lake RR. Pays for G-E 70-Ton Locomotives 2½ Years Early**

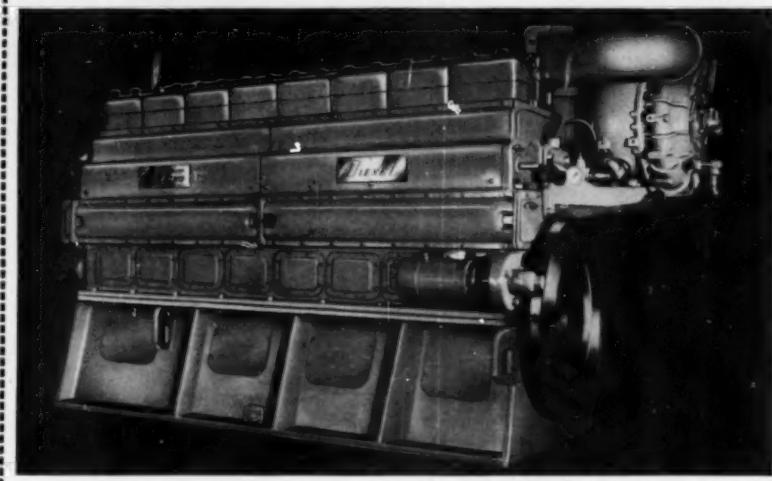


The 33-mile Belfast & Moosehead Lake Railroad, which threads through picturesque Waldo County in Maine, recently paid-off and burned a \$104,500 mortgage a full 2½ years before the final payment came due. The mortgage covered the purchase, in November, 1946, of two General Electric 70-ton 600-hp. diesel-electric locomotives.

Marked by official ceremonies attended by railroad officials, guests, photographers, and townsfolk, a check for the final payment on the new locomotives was presented an official of the First National Bank of Boston by B. & M. L. president and board chairman Clarence A. Paul. While representatives of the General Electric Company, Cooper-Besse-

mer Corporation, Bangor & Aroostook and Maine Central railroads celebrated with city officials and B. & M. L. past presidents, one of the old steam locomotives was being demolished to be sold as junk. President Paul attributed the early dissolution of the community owned and operated railroad's debt to the efficient operation of the G-E locomotives. He pointed out a direct fuel saving of approximately \$19,000 a year, plus additional savings in operating costs, bring the total closer to \$20,000. The mortgage on the locomotives was to extend for six years—from November 8, 1946, to December 10, 1952. Because of good business and successful operation, the obligation was paid in three and one-half years, saving the railroad \$3,998.75 in interest.

*More POWER... Less SPACE*  
WITH  
**STERLING VIKING DIESELS**



This 6-cylinder turbo-supercharged Viking Diesel is conservatively rated at 750 hp. Sterling Diesels are available in five different models beginning at 100 hp.

**DIESEL POWER**  
for all  
**INDUSTRY**

AUTOMATIC POWER PLANTS  
DRILLING RIGS — HOISTS  
LOCOMOTIVES — PIPE LINES  
GENERATOR SETS  
FISHING CRAFT — DREDGES  
LIFT BRIDGES — TOW BOATS  
COMPRESSORS — AIRPORTS  
VENTILATING SYSTEMS  
PUMPING STATIONS  
SHOVELS

Sterling Viking Diesel engines offer definite advantages in:

**Compactness** . . . more power in less space. A high ratio of horsepower to weight.

**Sturdy construction** . . . one piece block and base. All working parts are easily accessible.

**Dependability** . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

Without cost or obligation, talk over your power requirements with an experienced Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.



**STERLING ENGINE COMPANY**

1270 Niagara St.

Telephone Lincoln 0382

Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

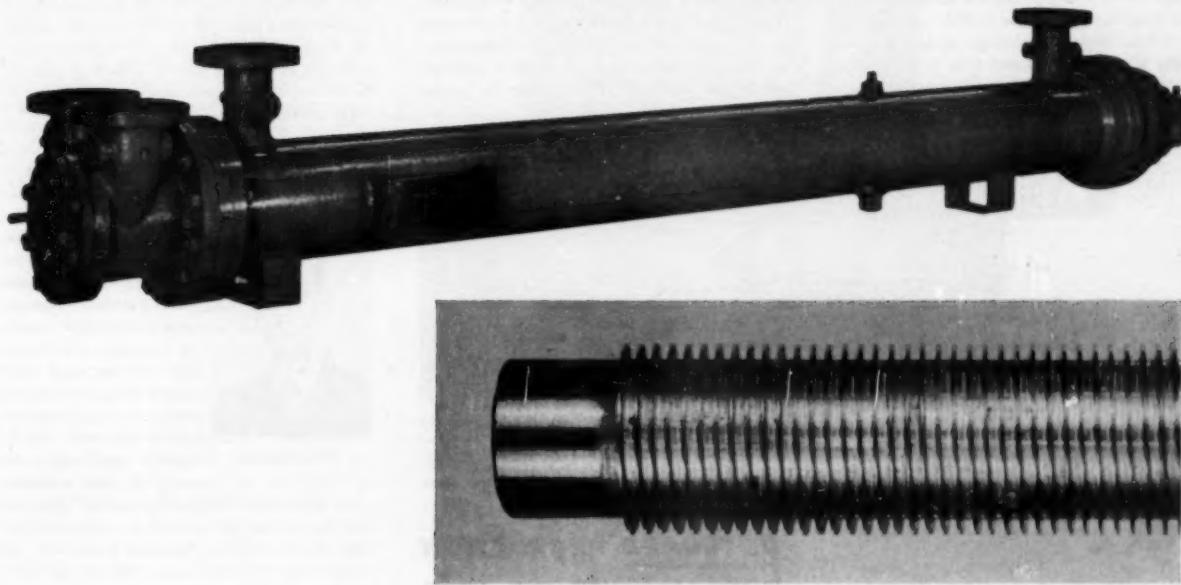
**New Tool Designed for Caterpillar Tool Bar**



The Root Plane, a tool designed specifically for range development but which can also be adapted for tillage of summer fallow and stubble mulch practice, has been placed in production as an added attachment to the newly developed Caterpillar Tool Bar. Mounted on a Caterpillar diesel D4 tractor and operated by a Caterpillar hydraulic cylinder, the unit has a set of twin sweeps, each with a 50-inch cut. These sweeps are detachable from the vertical standards and can be adapted to fit the gauge of the tractor. Cutting a 100-inch swath, depth of penetration is easily adjusted by the tilting features on the beam. Adjustment depth depends on variety of the brush and soil condition.

The Root Plane cuts the brush immediately below the bud ring, killing the brush, and insures the land against further sage growth. The tool will reduce ground swell to a minimum and keeps the soil firm around the grass roots. Avoiding destructive disturbance of the native grass sod is a much desired advantage of this successful weapon against the deeper-rooted noxious range shrubs and brush. In addition, this tool successfully undercuts all other kinds of brush, including grease wood and blackjack oak. Production for this new unit with the D4 tractor operating in third gear has been observed at 2½ to 3 acres per hour.

# Why the LK-FIN Exchanger *is more effective... more compact... more economical* for lube oil and jacket water cooling



When cooling apparatus was first applied to Diesel engine lube oil and jacket water more than 50 years ago, the coolers were of the traditional type . . . a bundle of conventional bare tubes within a shell. That was the only kind of cooler known in those days.

But since then, many major improvements have been made in heat transfer apparatus. One of the most important of these developments has been FINNED heat transfer surface . . . that is, tubes with fins attached to the outside. These fins greatly increase the external heat transfer surface, thereby permitting a considerably shorter tube to perform the same cooling effect that requires a much longer bare tube.

Griscom-Russell has pioneered in the development of finned type heat transfer equipment for almost 20 years. Now Diesel engine users can have

the benefit of this development as applied to lube oil and jacket water coolers.

The result . . . more effective heat transfer because of the finned tubes . . . a more compact cooler because of the more effective heat transfer surface . . . a more economical unit because of the shorter tubes and shell.

The LK-FIN Cooler has many additional advantages, too. The tubes are free to expand and contract. An outside packed gland at the floating end permits detection and elimination of leakage. Tube interiors are readily accessible at the stationary end without disconnecting piping. The coolers are built as stock units.

Complete description, specifications and prices will be sent without obligation.

THE GRISCOM-RUSSELL CO., 285 Madison Ave., New York 17, N. Y.

## GRISCOM-RUSSELL



## Twelve Diesel Locomotives for Long Island Railroad

David E. Smucker and Hunter L. Delatour, Trustees of the Long Island Railroad, have asked the Federal Court for permission to buy 12 more diesel-electric passenger locomotives in order to completely dieselize the railroad's passenger service in non-electrified territory. The Long Island now operates 18 diesels in passenger service, replacing steam locomotives, and acquisition of the 12 new diesels would permit the retirement of 17 more steam locomotives and entirely eliminate the use of steam engines in passenger service. The new diesels would be purchased with funds realized from the sale of surplus electrical material, equipment and scrap not needed in the operation of the railroad.

In a petition filed recently with Judge Harold M. Kennedy in Brooklyn, the Trustees point out that upon taking office, they inaugurated the first use of diesel-electric locomotives in passenger service on the Long Island with diesel switching engines to the extent these could be released from yard freight service. At the same time, road tests were made of 2,000-hp. diesel passenger locomotives. As a result of these operations the Trustees concluded that operating efficiencies and economies would be obtained through the use of diesel locomotives instead of steam locomotives in passenger service, and asked the Federal Court for permission to acquire eight 1,000-hp. diesel switching locomotives and six 2,000-hp. diesel passenger locomotives with unexpended equipment trust funds arranged for before the bankruptcy, and to purchase two 2,000-hp. diesels on their own account. These locomotives since have been acquired, and the eight 2,000-hp. diesel passenger locomotives and four of the 1,000-hp. diesel switching locomotives, equipped with train heating boilers, are presently in operation in passenger service in place of steam locomotives previously used. In addition, the Trustees have recently acquired, out of funds realized from the sale of land not needed for transportation purposes, one 1,500-hp. diesel passenger locomotive, making a total of eighteen diesel-electric locomotives now operating in passenger service.

The Cooper-Bessemer Corporation recently revealed that for several months John Fullerman, internationally recognized authority on engine supercharging and centrifugal compressor design, has been at work with the company's engineering staff coordinating a broad engine development now underway at its Mt. Vernon headquarters plant. "Our purpose in retaining the services of a compressor design authority like Mr. Fullerman is two-fold," explains Ralph L. Boyer, vice president and chief engineer of Cooper-Bessemer. "It is, of course, becoming increasingly evident that future demands on gas and diesel engines will of necessity call for further increases in horsepower output without corresponding increases in size or weight. This requirement, in addition to the engine builder's constant desire to achieve still greater economies of operation, obviously calls for further acceleration in our continuing program of research and development in engine supercharging, work for which Mr. Fullerman is already well known. On certain types of pumping service for gas transmission lines," Mr. Boyer continues, "centrifugal compressors in some places are being considered for complementing reciprocating type compressors similar to those manufactured by our company.

## Centrifugal Compressor Authority at Cooper-Bessemer



John Fullerman

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As builders of the engines that drive these centrifugal compressors, it is imperative, therefore, that our engineering department have on its staff an outstanding authority with broad experience on the mechanics as well as the economics of centrifugal compressor operation."

Swiss born, Mr. Fullerman received his technical engineering background at the Federal Institute of Technology in Zurich, Switzerland. During the last war he was the field representative for Buchi, well known Swiss engineering firm, adapting Swiss designed exhaust driven superchargers to American built engines. He is now an American citizen and resides in Mt. Vernon, Ohio.

**HOLLINGSWORTH & WHITNEY COMPANY**  
PAPER MANUFACTURERS  
WATERVILLE, MAINE

GEORGE A. SMUCKER  
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GEORGE G. KELLOGG  
Controller

July 13, 1950

Murray & Tregurtha, Inc.  
Quincy, Mass.

Attention Mr. Gordon Munro

Dear Mr. Munro:

As I believe you will recall, we used the Harbormaster in towing on Ayer's Lake last season. The lake is about 15 miles long and about 1-1/2 miles wide. We feel you would be interested to know that she did a marvelous job. The tow was based on a 3000 cords boom, but they towed from 2500 to 4000 cords to a boom. At times the boat would be tied up on sluicing and would not be back to the booming out place and they would put in extra sticks and tow up to 4000 cords in one hour. The boat handled it very satisfactorily and towed some 75,000 cords during the season.

Very truly yours,

*Hawley*  
Hawley, President  
Engineering Log Drawing Company

Write for Harbormaster Catalog containing over 70 photos and diagrams.

**Murray & Tregurtha**  
**HARBORMASTER**  
Outboard Propulsion  
And Steering Units

**MURRAY & TREGURTHA, INC.**  
6 Hancock Street, Quincy 71, Mass.

## Exchange Maintenance Ideas

...Continued from Page 52...

ever, we are faced with the problem of choosing either engines with a piston speed of 1,000 FPM or less, connected to the pumps through speed increasers, or going to 720 RPM diesels with piston speeds above 1,000 FPM, but direct connected to the pumps.

"We evaluate the difference in 'Annual Cost of Operation,' in which evaluation we include fuel and lube oil costs, plus maintenance and miscellaneous charges per installed horsepower. It is these last items that are most intangible. We can determine such charges for low speed engines from the 'Oil Engine Power Cost Report' published by the A.S.M.E., but we have no such authority for reference for the high speed engines. We are wondering whether DIESEL PROGRESS has available the information we desire or whether we could hear from some of your readers who are using engines of that size and rpm?"

Unfortunately DIESEL PROGRESS does not have that information in an authoritative state so we are passing this problem on to our readers with the hope that some of you may give us your experiences along this line for future publication. Your author has taken the matter up with several diesel and pump manufacturers and the consensus of opinion as received from them is that the cost of slow speed units with speed increasers is almost prohibitive, that the best solution would be to use a diesel of approximately 600 rpm with speed increasers and a pump of 1800 rpm or higher. Most of them maintain that this setup is the most economical for operation. Please let us have your comments.

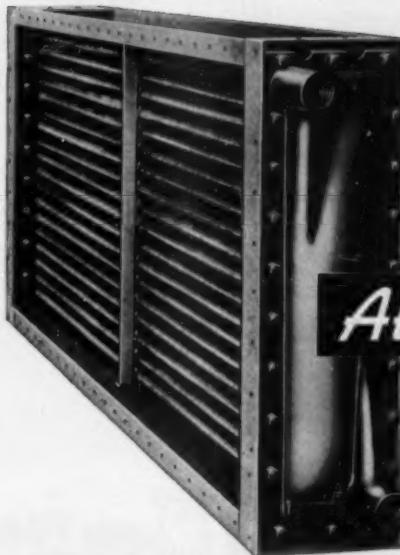
### Big Diesel Truck



Jim Bain, right, New York Branch Manager for White Trucks, points out the Cummins diesel engine in the White Truck at the A.T.A. Convention.

One of the features which attracted thousands of New Yorkers at the recent 17th Annual Convention of the American Trucking Association was the White All-A.T.A. line of trucks. The truck, powered by a Cummins diesel, is designed for long distance over-the-road hauling jobs.

The White Motor Company reports the sale of a number of buses to the Cleveland Transit System. The delivery of the new buses is scheduled for the early part of this year.



**AEROFIN**

**Heat-Transfer Surface**

- High Efficiency
- Long Service Life
- Low Maintenance Costs

You are assured of high efficiency in heating or cooling—long service life—low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

The reason is obvious: Aerofin makes heat exchangers exclusively—offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research—and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.



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Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

## C.A.V. Announces Agency Appointments

The C.A.V. Division of Lucas Electrical Services, Inc., New York, has announced the appointment of a number of agencies to carry and service diesel fuel injection equipment of their manufacture across Canada. Mr. W. S. Dack, vice president and head of the C.A.V. sales office in Cleveland, who carried on negotiations with these agencies, stated that C.A.V. is now in position to render complete and prompt service to all users of C.A.V. fuel injection equipment throughout Canada.

The list of these agencies is as follows: Auto Electric Service Co., Ltd., 1009-1027 Bay Street, Toronto;

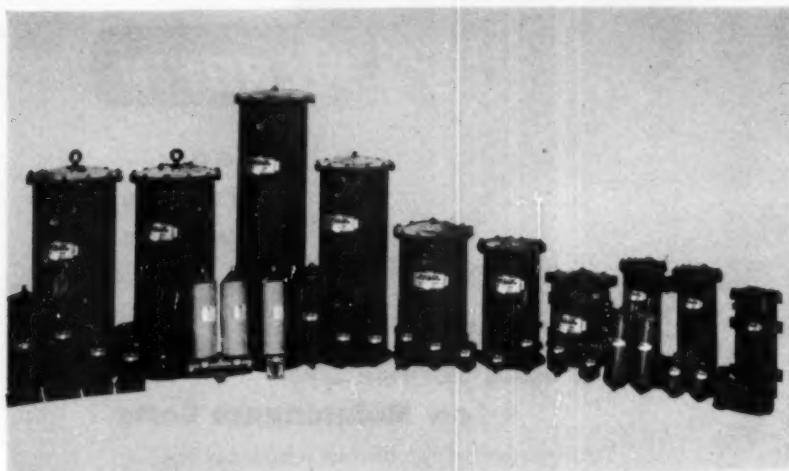
to 5, Canada; Beattie Auto Electric Ltd., 176 Fort Street, Winnipeg, Canada; Electric Motor Service, 1734 Broad Street, Regina, Saskatchewan, Canada; Boulbee Ltd., 1025 Howe Street, Vancouver, B. C., Canada; Hutton's Limited, 131 Eleventh Ave., West Calgary, Alberta, Canada; branches at Lethbridge and Medicine Hat; A. H. H. Murray & Co., Ltd., St. Johns, Newfoundland; Loveseth Limited, 106 First Street, Jasper Avenue, Edmonton, Alberta, Canada; branch at Red Deer; Lambert Electric Co., 114 Avenue A, North, Saskatoon, Saskatchewan; Joseph Lucas (Canada Ltd.) control the sale of C.A.V. spares throughout Canada, and they are situated as follows: Joseph Lucas (Canada) Ltd., 2299 Dundas Street West, Toronto, Ontario, Canada; Joseph Lucas (Canada) Ltd., 7035 Grand

Avenue, Montreal, Quebec, Canada; the C.A.V. Service Engineer for Canada is Mr. H. Mogg, who is located at 2299 Dundas Street West, Toronto,

## New Crawler Tractors



Two new crawler tractors are being added to the Allis-Chalmers line this month, according to an announcement made by W. A. Roberts, Executive Vice-President and Manager of the Tractor Division. With these two models—the HD-9 and the HD-15—Allis-Chalmers now offers a modern tractor in each of the four major power categories. The new units, being produced in the company's expanded Springfield, Illinois, Works, are scheduled for delivery to dealers early this year. The company states that each of its four crawler models provide more weight and power than previously considered standard for their classes.



## WINSLOW has the **RIGHT FILTER** for **YOUR ENGINE**

You know from your own experience that the amount of fuel or lubricating oil used by one engine—and the rate at which it flows—is probably not the same as in another engine of a different size or power rating. Thus, when you want to protect your fuels and lubricants from dirt, you must have *the right size filter for your engine*. Winslow not only makes a filter of the size you need, but Winslow engineers are ready and willing to recommend that right size filter from the more than 100 models made by this pioneer manufacturer.

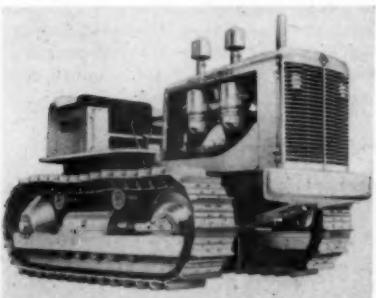


WRITE US FOR YOUR FREE COPY OF OUR EASY-TO-READ BOOKLET, "THE CASE OF THE DIRTY DRIP."

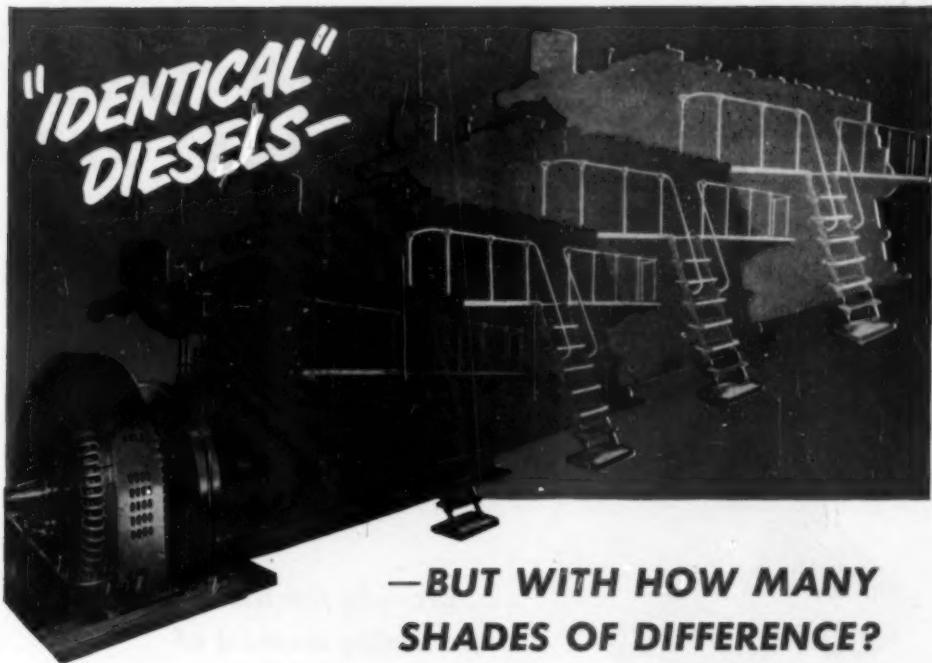
## WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

W-511



Power is provided for both the HD-9 and HD-15 by heavy duty General Motors 2-cycle diesels which utilize a unit injection system. Common to both models is the constant mesh transmission, with separate reverse gears, which permits the operator to shift from forward to reverse in any speed with one movement of a single control lever. Unit assembly construction enables servicemen to remove and install each unit in the power train—engine, clutch, transmission, steering clutch and final drive—without disturbing related assemblies. A third benefit is the use of Positive Seals in final drive, truck wheels, idlers and support rollers. *Specifications.* Model HD-9: 70.0 drawbar hp.; weight, 18,500 lbs.; six speeds forward to 5.68 mph., three reverse speeds to 4.43 mph. Model HD-15: 102.0 drawbar hp., weight, 27,500 lbs.; six speeds forward to 5.80 mph., three reverse speeds to 4.51 mph. Catalogs describing each of the tractors can be obtained from local A-C dealers or by writing Allis-Chalmers, Tractor Division, Milwaukee 1, Wisconsin.



**"IDENTICAL"  
DIESELS—**

**—BUT WITH HOW MANY  
SHADES OF DIFFERENCE?**

When they're delivered to the buyers a number of Diesels may be identical in make and model. But in actual use . . . working in different plants and climates . . . differently loaded, operated and serviced . . . the "identical" Diesels soon differ even more than just a shade. That's one reason the lubrication which seems ideal in one particular case may cause a similar Diesel working elsewhere to run up unnecessary downtime.

You can guard against the adverse effects of such variables . . . against the improper lubrication of your costly Diesels . . . by calling in a Cities Service Diesel Lubrication specialist. He knows all types of Diesels and their lubrication; he knows practical plant procedure, too. That's why the

Diesel lubrication schedule he will be glad to develop especially for you can provide far better protection for your Diesels—and for your profit showing. Contact the Cities Service office nearest you, or mail the coupon now for booklet on "Diesel Engine Lubrication."

**The Cities Service complete  
line of top quality petroleum  
products includes a Diesel  
lubricant for every  
operating condition.**



CITIES SERVICE OIL COMPANY  
Sixty Wall Street, Room 917  
New York 5, N. Y.

Please send me without obligation your booklet on  
Diesel Engine Lubrication.

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MADISON-KIPP

# Fresh Oil LUBRICATORS



... provide the most  
dependable method of  
lubrication ever developed

Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines, and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement.

## MADISON-KIPP CORPORATION

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ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS



# let an old sea dog teach you new tricks

Take a tip from the hard-bitten experience of seasoned old seadogs who skipper diesel-powered fishing craft and other work boats.

Pioneers in diesel use, they'll tell you that with modern diesel power there are new tricks you can learn in greater efficiency and unfailing performance . . . lower operating and maintenance costs . . . trouble-free, uninterrupted service.

Dependable fuel injection equipment supplied by American Bosch is a vital element in making possible these profitable results.

Through its extensive research, development and field engineering—unrivaled precision manufacture—and its strategic network of service agencies—American Bosch plays a big part in bringing the advantages of dependable, low-cost diesel power to ever-expanding and diversified fields of application.

Dependable Fuel Injection for the Diesel Industry



## American Bosch

MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS  
ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7 • MASS.

**Promotions at General Motors**



R. V. Baxley

E. F. Bentley

V. C. Genn, general sales manager, has announced several changes in the sales department of Detroit

Diesel Engine Division, General Motors Corporation. E. F. Bentley, formerly contractors' equipment sales manager, has been promoted to sales operations section manager. R. V. Baxley, who has been Mr. Bentley's assistant in the contractors' equipment sales department since October, 1945, has been appointed sales manager of contractors' equipment sales. "Contractors' equipment sales" actually covers more than the name implies, as there are many machinery or equipment customers handled by this department whose end products are not limited to the contracting industry, but include mining machinery and other industrial machinery manufacturers. As assistant to Mr. Baxley is L. H. Wells, who has been transferred to this

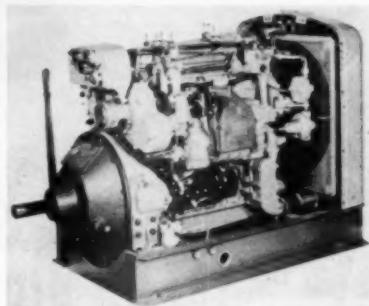
position from his former duties as a field sales engineer covering contractors' equipment sales in Wisconsin, Minnesota, Iowa, the Dakotas, and most of Nebraska.



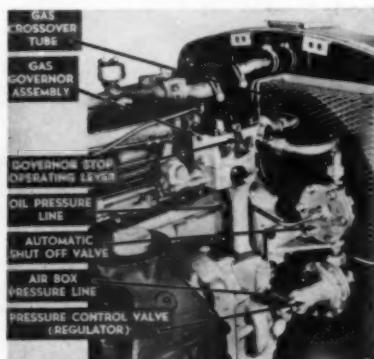
L. H. Wells

Other changes in the contractors' equipment sales section are as follows: Paul Merkert, who was the field sales engineer in Indiana, Illinois, Missouri and Kansas, will take over Mr. Wells' former territory. Mr. Merkert resides in La Grange, Illinois. G. R. Holly has been promoted from sales correspondent to sales engineer in Mr. Merkert's former territory and will operate out of Detroit. W. T. Greene will replace Mr. Holly as sales correspondent and A. E. Jones has been added to the staff to handle special assignments.

**Dual Fuel for Detroit Diesel**



The Detroit Diesel Engine Division of General Motors has announced a new option on Series 71 diesel engines which enables them to burn natural gas in accordance with true diesel high-compression principles. This option is available both on new engines leaving the factory and engines already in use. For the latter a factory-engineered kit is available for the changeover. The change-over permits the engines to burn either natural gas with a pilot charge of diesel fuel or diesel fuel alone. There is no interference with the operation of the unit as a straight diesel fuel engine when required.



Change from dual-fuel to diesel fuel operation is accomplished instantly by moving a small lever

*Since 1885*  
**UNSURPASSED  
DEPENDABILITY...**

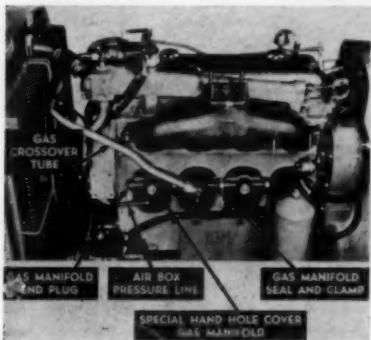
Today's modern UNION Diesel products\* incorporate and pioneer improvements which assure unsurpassed dependability for your —  
**Greater Safety • Lower Operating Costs  
Long Term Satisfaction • Increased Profits**

\*DIESEL ENGINES  
DUAL-FUEL ENGINES  
GENERATOR SETS  
HEAT EXCHANGERS  
ALARM SYSTEMS  
CUSTOM MACHINERY

**UNION  
DIESEL**

2121 DIESEL STREET • OAKLAND 6, CALIFORNIA, U.S.A.

on the gas governor assembly. When the lever is in the forward position the engine will operate either on straight diesel fuel or on gas (with a pilot charge of diesel fuel) depending on the availability and pressure of gas in the line. This is an important feature to owners who have occasion to operate their units both in natural gas areas and in areas where natural gas is not available. The changeover permits the added economy of natural gas whenever available, and affords maximum flexibility between the two forms of operation. The dual-fuel unit has no electrical ignition system. Natural gas is delivered to the cylinder and fired by a small charge of diesel fuel at the top of the compression stroke. The engine instantly adjusts itself between the use of natural gas (with a pilot charge of diesel fuel) and straight diesel fuel in case the gas pressure falls off partially or completely. An automatic shut-off valve activated by the rise and fall of engine oil pressure cuts off the flow of gas when the engine is not in use.

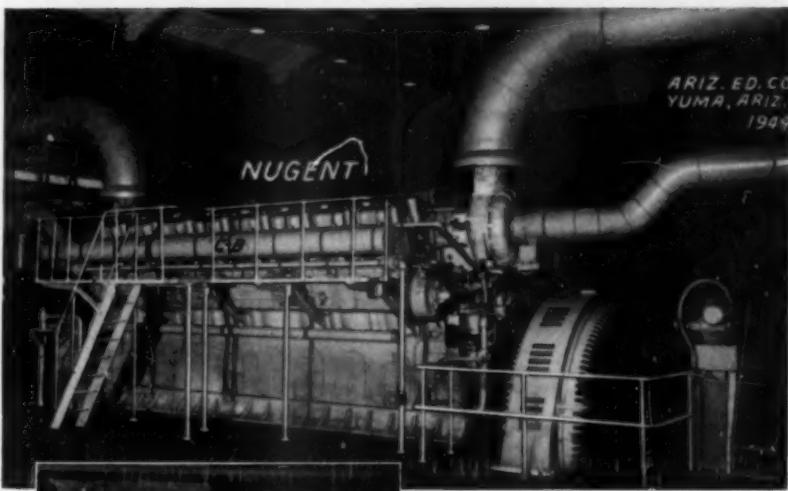


The performance of these units on "Sour Gas" (natural gas with a high content of undesirable chemical elements) or "LP" gases has not been fully established. To date the factory has recommended their operation only on natural gas. According to Detroit Diesel, the advantages of the dual-fuel engine as developed in the field are added fuel economy in areas of abundant natural gas; instant changeover from dual-fuel to straight diesel operations; quick response to load and lowered upkeep due to non-sludging properties of natural gas as a fuel. A booklet describing the engine in detail is available from GM Diesel distributors or upon request to the Detroit Diesel Engine Division, 13400 West Outer Drive, Detroit 28, Michigan.

#### Nine Foreign Exhibits at Boat Show

The 41st Annual National Motor Boat Show, January 12-20, will take on an international atmosphere when nine foreign builders of boats and manufacturers of marine engines and accessories exhibit their products at Grand Central Palace in New York City, according to Joseph E. Choate, manager of the exposition. Six British firms or their representatives, together with a group of builders from the Netherlands and two from Canada will be represented. From among these organizations, Lister-Blackstone, Inc., one of England's leading engine manufacturers and ABOE, Inc., representing several British firms, will display a varied line of diesel engines.

# Where dependability is essential...



1949  
ARIZ. ED. CO.  
YUMA, ARIZ.

Typical of the dependability requirements that make Nugent filtering a must is this diesel power plant located at Yuma, Arizona, owned by the Arizona Edison Co. The Cooper-Bessemer engine shown in the large illustration is equipped with a Nugent Fig. 1280A size No. 4L4 lubricating filter mounted below the floor (see smaller illustration).

## NUGENT OIL FILTERS are a must!

The best protection your diesels can have is dependable filtering equipment for fuel and lube oil. Nugent absorbent depth type pressure filters fill this bill. Carefully controlled tests show that Nugent Absorbent Filters remove 99.8% of the harmful impurities that can get into your oil. This is the type of filtering that greatly extends the life of all the moving parts in your engines and results in substantial savings of oil, as well.

There is a size and type of Nugent filter to meet every requirement, whether it be for diesel fuel or a turbine lubricating system. Whatever your need, it will pay you to take advantage of Nugent's long experience and filtering "know-how". Write today for complete information, outlining the nature of your problem. It's the first important step toward lengthening the useful life of your equipment.



Established  
1897

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### New Bulletin Available

Publication of a new bulletin on the Marion Type 111-M machine has been announced by Marion Power Shovel Company of Marion, Ohio. Bulletin No. 402, a two-color 12 page booklet, gives a complete design and performance story on the 111-M. This machine, equipped with diesel, electric swing and Marion control, is available as a shovel, dragline, clamshell, crane or long range shovel. The 111-M carries a four cubic yard dipper as a standard shovel and a  $3\frac{1}{2}$  cubic yard dipper as a long range shovel. Dragline bucket capacity varies from 3 to 5 cubic yards, depending on the length of the boom. The machine is designed for

service in the construction, coal stripping, quarrying and mining industries. Copies of Bulletin No. 402 can be secured from Marion sales representatives or from the company's general offices.

### Booklet Describes Standardized Rural Substations

Substations built up from standardized components for rural distribution systems are described in a 12-page booklet, "Westinghouse Standardized Substations for Rural Distribution Systems" (B-4697), recently released by Westinghouse Electric Corporation. Combinations of the various parts described in the booklet cover over 95 per cent of all

rural substation requirements. The standardized components are furnished as single units reducing the problem of ordering a complete substation to the specification of only a few items. Material and installation costs are reduced by standardization. The booklet shows pictorially six of the more common substation arrangements. By folding over extended pages, different combinations of parts are shown on the basic layout. Bills of material dimensions, and symbolic diagrams, are given for each combination. For a copy of this booklet (B-4697) write Westinghouse Electric Corporation, P. O. Box 2099, Pittsburgh 30, Pennsylvania.

### Versatile Tracto-Shovel



After a haul road has served its specific purpose, this G. M. diesel-powered Allis-Chalmers HD-5G tracto-shovel is assigned to salvaging gravel for another haul route. E. K. Jones, tractor owner and sawmill operator near Rosebury, Oregon, explains that gravel is very scarce in the Rosebury area. It is more economical to remove gravel from one haul road to another than it is to buy a new supply. When the HD-5G isn't salvaging gravel it's maintaining haul roads to the sawmill, which produces about 25,000 board feet per day. Output of this volume undoubtedly accounts for the fact that although lumber sales are 41.5 per cent above last year's figure, retail lumber dealers have not drawn down stocks. This data was just released by the National Retail Lumber Dealers Association.

Resists heat when it's  
20 below

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DHD  
MOTOR OIL  
with Extrinol

Meets New U. S. Specifications MIL-S-2104

Cold weather Diesel operation demands an oil that provides high heat-resistance and can still withstand sub-zero temperatures.

D-X DHD with Extrinol is the winter-time choice of many Diesel operators, because it flows freely in cold weather yet loses none of its high heat-resisting properties.

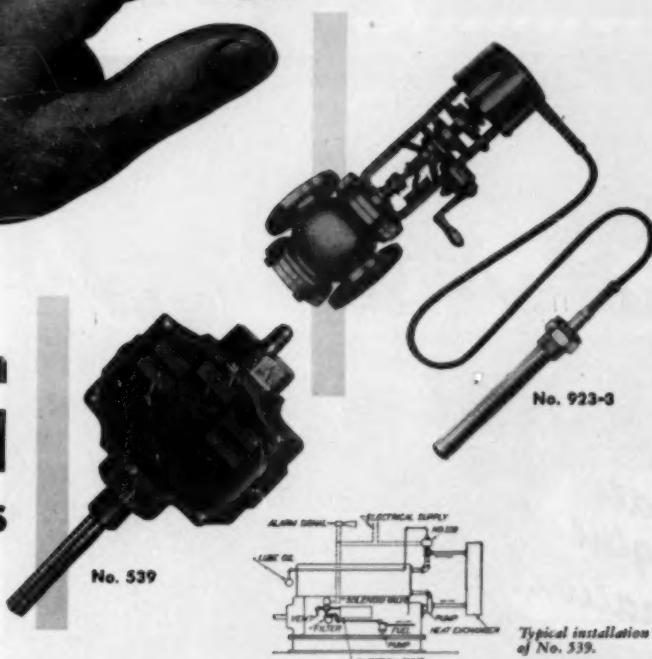
The "extra" of Extrinol in D-X DHD makes it a tougher, safer, more economical Diesel oil in any weather. Try D-X DHD under the terms of the D-X Trial Bond. Your money back if you're not satisfied that it is a better Diesel oil!

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Why take chances  
on engine trouble?

Depend on  
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No. 923-3 Regulator is equally dependable. It thermostatically controls cooling water circulation—keeps engine jacket temperature right. Can be manually operated—if and when desired!

Both controls are ideally suited to diesel, gas or other internal combustion engines. Self-contained and self-powered, they're built to give you long, trouble-free service. Easily installed. For complete information, send for Bulletin AL-817.



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DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

Canadian Representative, Darling Brothers, Montreal

## Diesels Help Flowers



Production of flowers and flower seed and bulbs is big business for Edwin Frazee of Oceanside, California, and International Harvester tractor power figures big in this production. Mr. Frazee operates a 240-acre farm which he leases from the U. S. Government. It is part of the U. S. Marines' Camp Pendleton and borders on the Pacific Coast and busy coast highway No. 101. This past season Mr. Frazee had 30 acres in ranunculus and he claims he is the largest producer of ranunculus bulbs in the world. When the flowers in these 30 acres are in bloom he said artists, photographers, and flower lovers come from many places to view and feast on the beauty of this massed color dis-

play and to make pictures. He also had 35 acres in gladioli and a considerable acreage in anemones and other flowers. His straight farm crop is beans, both string and lima, totaling 115 acres. Mr. Frazee is shown on his recently purchased International TD-9 diesel crawler tractor pulling a stiff-tooth cultivator or chisel. He also utilizes six Farmalls.

## New President



Howard Cooper

Howard Cooper, manager of technical service of Sinclair Refining Company, New York, was elected president of the National Lubricating Grease Institute at the annual meeting of that organization held recently in Chicago. Mr. Cooper was first elected to the Board of Directors of

the Institute in 1946, and since then has served on numerous committees, including the membership and program committees. During the past year, Mr. Cooper has served as vice president, in which office he has been largely responsible for the program of the 1950 meeting.

This meeting was the largest in the history of the National Lubricating Grease Institute, with registration substantially above any previous year. Member companies of the Institute represent better than 95 per cent of the country's entire output of lubricating grease. Also included on the Institute's rolls as associate members are supplier companies to the grease industry, representing chemicals, containers, and instruments, as well as manufacturing and dispensing equipment. Technical memberships in the Institute are held by research and educational institutions.

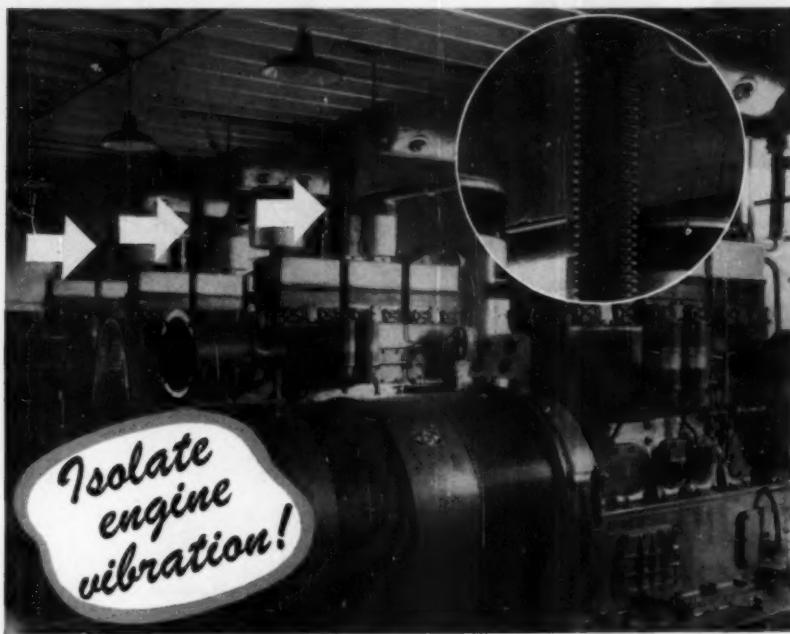
Mr. Cooper began his connection with the petroleum industry before the first World War. He has been associated with Sinclair Refining Company since 1923, except for 3½ years during World War II, when he served in the Petroleum Administration for War as section chief in the marketing division. He is a member of the A.S.M.E., S.A.E., A.S.T.M. and A.S.L.E.

## Suit Dismissed

The suit brought by the United States against the Lanova Corporation seeking to cancel certain of the company's patents has been dropped and an order has been entered accordingly. The action has been terminated on the merits and the validity of the patents is no longer in question.

## Louisville & Nashville Adds to Diesel Fleet

The Louisville & Nashville Railroad has purchased 62 additional diesel-electric locomotive units costing over \$8 million. John E. Tilford, L&N president, said that the purchase is an extension of an order for 26 diesels placed in September and which are scheduled for delivery early in 1951. Delivery of the 62 additional units is expected to begin next April and be completed by July.



## with CMH FLEXIBLE CONNECTORS for INTERNAL COMBUSTION ENGINES

 In new installations or existing ones, CMH all-metal flexible connectors will isolate engine vibration from fixed exhaust or air intake lines. They will also absorb expansion or contraction and correct for misalignment. Leak-tight and fatigue resistant, CMH flexible metal connectors give long, dependable, maintenance-free service.

Available in steel or stainless steel in sizes from 1" to 30" I.D. Standard assemblies are made with pipe nipples, couplings, fixed or floating flanges as required. Write for full details and specification sheets.

*The illustration above shows CMH Flexible Connectors installed in the exhaust lines of these diesel-electric generating sets.*

### Other CMH Assemblies for Internal Combustion Engine Service

CMH REX-WELD Corrugated Flexible Metal Hose with or without metal braid covering is pressure and vacuum tight and serves as an ideal flexible connector for lines conveying fuel, air, water, oil, etc. Available in sizes from 3/16" to 4" I.D.

CMH FIRE PROOF Flexible Metal Hose is available for installation where the ultimate in fire protection is required. Sizes 5/16" to 8" I.D.

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**CMH—ONE dependable source**  
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#### Increased and more uniform heat transfer

Binks Type "D" evaporative heat exchange coils assure Diesel operators uniform...economical engine performance. Two-way cooling by "evaporation" and "convection" plus higher velocity of hot jacket water inside coils gives increased heat transfer. Scale formation in engine jacket is prevented since jacket water never mixes with raw cooling water. Breakdowns are reduced; insurance cut.

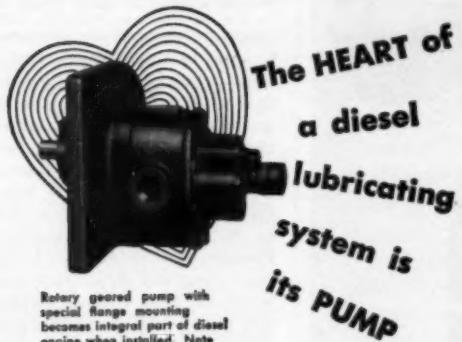
Send for Bulletin 41. Obtain full information—drawings, tables—on heat exchange coils adaptable to a variety of operating conditions.



**Binks**

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Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

Modern diesel operation generally requires a pressure lubricating system—and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I. U. S. A.

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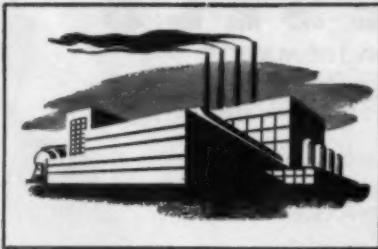
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ORIGINATOR OF MICRONIC FILTRATION

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Nine times out of ten Bendix-Skinner filters will supply the "finest" answer to your problem. No magic—just the simple fact that Bendix-Skinner has developed entirely new and exclusive filtering techniques in twenty years of tackling the tough jobs. We'll welcome an opportunity to prove it. An inquiry costs you nothing and may save you much.

Over 350 Models providing filtration from  $\frac{1}{2}$  micron ( $.000019"$ ) upwards at flow rates from 1 to 5000 g.p.m.



### Completes 25 Years With Firm

Ralph R. Layte, President of Purolator Products, Inc., Rahway, N. J., manufacturers of automotive and other filtration equipment, was recently honored by company directors, officials and personnel on completion of 25 years with the firm. He was appointed president in 1941 after starting in 1925 as an engineer. In afternoon ceremonies at the plant cafeteria, Mr. Layte received a wrist watch and membership pin in the Purolator 25 Year Club from William V. Griffin of New York, chairman of the board of directors. Pin and watch are traditional awards to employees who have completed 25 years with the company. Present at the surprise testimonial banquet held at the Robert

Treat Hotel, Newark, that evening were directors James A. Abeles, one of the founders of the company; James C. Brady; John W. Hanes, former Undersecretary of the U. S. Treasury; Carlos D. Kelly, Purolator vice-president in charge of sales; Simon Letzler, former vice-president and controller; Carl M. Owen; Clarence E. Searle and Frank P. Herman. The latter is also executive vice-president of Purolator. Executive officers and managerial staff members who attended were Herbert W. Thogore, treasurer; David W. Barry, assistant treasurer; William M. Kane, assistant secretary; Melville D. Johnson, vice-president in charge of manufacturing; and Jules P. Kovacs, vice-president in charge of engineering. Mrs. Layte was among the guests of honor.

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AIR-COOLED  
DIESELS  
ON THE MARKET

Product of the Armstrong-Siddeley group, manufacturers of the world's most powerful aerojet engine, the "Sapphire". Sold and serviced exclusively by LISTER-BLACKSTONE.

#### MODEL AS-1

8 Hp.—1 cyl. 1200-1500 r.p.m.

#### MODEL AS-2

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- Suitable for all SAE attachments
- Standard 12-volt Autolite starting
- ATTRACTIVELY LOW PRICED.
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Write for literature and prices. Outline your requirements.  
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### Distributor Honored



Harold Woolley, president and owner of the Woolley Logging Company, Drain, Oregon (third from left), hands check to Frank Cooper, president of Howard-Cooper Corporation (third from right), for purchase of 100th International TD-24 crawler tractor sold by the Portland industrial distributor during 1950. Other IH and HC officials witnessing the sale were: Frank Parker, general sales manager, Howard-Cooper Corporation; Jack Bess, assistant regional manager, industrial power, International Harvester (western region); I. P. Payne, assistant sales manager, industrial power, International Harvester; and T. B. Hale, vice president, general sales, International Harvester.

Several top officials of the International Harvester Company recently flew to Portland, Oregon, from Chicago in the firm's private plane to pay tribute to their Oregon industrial distributor for the record sales achievement of 100 of the company's giant crawler tractors during 1950. Occasion of the event was the sale of the 100th International TD-24 crawler tractor by the Howard-Cooper Corporation in their sales territory. The tractor was purchased by Harold Woolley, president and owner of the Woolley Logging Company, Drain, Oregon.

Officers and officials of the International Harvester Company from Chicago who participated in the special ceremonies honoring the Howard-Cooper Corporation included: T. B. Hale, vice president, general sales; A. J. Peterson, general sales manager; I. P. Payne, assistant sales manager, industrial power; M. F. Peckels, manager, consumer relations department; and Jack Bess, assistant regional manager, industrial power (western region). H. W. Berry, Harvester's general sales district manager at Portland, also was present for the occasion along with his assistant managers, A. H. Mason and F. M. Farleigh. Howard-Cooper officials participating in the ceremonies included: Frank Cooper, president; William Wiley, vice president; and Frank Parker, general sales manager; and managers of the Howard-Cooper branches at Portland, Eugene, Roseburg, Albany, Central Point and Coquille, Oregon, and Seattle, Washington. During their brief visit to the Pacific Northwest the Chicago Harvester officials also flew to Seattle, Washington, to inspect the new plant recently completed by the Howard-Cooper Corporation in that city.

The International TD-24 crawler tractor with which the Howard-Cooper Corporation set the record sales of 100 during 1950 weighs over 40,000 pounds, is 15 feet long, and has 148 drawbar hp. Oregon and Washington's rugged terrain makes the mechanical giant particularly adaptable for yarding the big logs cut from the big fir trees found in this vicinity.

## Bronx Manager of Mack Trucks



W. A. Brady

W. A. Brady has been appointed manager of the Bronx branch of Mack-International Motor Truck Corp., announces P. J. Degnon, vice president of the company. Mr. Brady joined Mack in 1936 as a salesman at the company's Brooklyn branch. He was appointed manager of

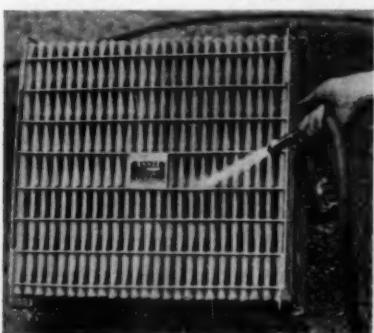
Mack's White Plains branch in 1949, and later was assistant district manager of the company's New York City branch. A native of the Tremont section of the Bronx, Mr. Brady is well known in sports circles. As "King" Brady he at one time played baseball in both the American and National Leagues.



**MACKS FOR THE BRONX**—Here are 15 new Mack Manufacturing Corporation C-45 buses lined up in the Bronx for delivery to the Surface Transportation Corporation of New York. They represent just a quarter of the 60 new dieselized Mack buses acquired by the corporation. Another 25 were purchased last year.

## Announce New Air Filter

The Air Filter Division of Royal Heaters, Inc., announce the marketing of their new, improved Annis Air Filter, designed specifically for use on diesel engines. The manufacturer states that their new filter features the same high percentage of dust removal as in the past plus great adaptability in combination with low maintenance and replacement cost. The same basic features are incorporated in all their filters regardless of whether they are for a small engine or a ship-propelling unit.



The Annis Air Filter has been known in the industry generally for the past 25 years. The company was recently reorganized as the Air Filter Division of Royal Heaters, Inc. It will devote its efforts exclusively to the manufacture of air filters for diesel engines. Mr. E. F. Annis, the founder, remains with the organization as consultant. For more detailed information on this filter, write DIESEL PROGRESS, File 77, P. O. Box 8458, Los Angeles 46, California.

Canada. Mr. Dack further stated that as the use of C.A.V. fuel injection equipment is extended in the United States a similar program of agency appointments will be pursued in this country.

## New Four Page Bulletin

Baldwin Locomotive Works announces a new 4-page bulletin, No. 321, covering Series 600 diesel engines. These engines have a 12½-inch bore, 15½-inch stroke, and a speed range from 360 to 625 rpm. They include both naturally aspirated and supercharged engines for stationary and marine service. The bulletin includes design features and specifications, performance curves, and ratings, which range from 430 to 1,500 hp. Illustra-

tions include cross sections, dimensional drawings and rating charts.

## Budd to Build 12 Diesels for Consolidated Railroads of Cuba

Budd Co., Philadelphia, has received an order for 12 self-propelled rail diesel cars from the Consolidated Railroads of Cuba. The cost of the order was not disclosed. Deliveries are expected to commence early in January. The new cars, which can be operated as single units or in multiples as trains, will be used on subsidiaries of the Consolidated Railroads of Cuba—the Cuban Railroad, the Cuba Northern and the Guantanamo & Western.

**EATON**  
**VALVES**  
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**DIESEL**  
*Engines*

For more than 30 years Eaton has been privileged to cooperate with the country's leading Diesel engine builders in furnishing valves and other valve train parts. These engine manufacturers have found that Eaton's broad experience in the Diesel engine field and Eaton's understanding of the problems peculiar to Diesel engineering, are as valuable to them as the quality of the valves produced.

Eaton engineers will welcome the opportunity to discuss the application of Eaton valves to engines now in design or in production.

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**EATON PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Stop Rings • Springless & Spring Washers • Cold Drawn Steel • Stamping • Heat Treatment • Ingersoll-Dresser Diesel Engines • Dynamometer

### Diesels for New Towboats



The National Supply Company recently shipped the first pair of four diesel engines from the com-

pany's engine division at Springfield, Ohio, for the Pittsburgh Consolidation Coal Company's two new towboats being built at Dravo Corporation in Pittsburgh. The engines, Model 40 Superiors, will each develop 533 shaft horsepower at 750 rpm. while driving the propellers through a reverse and reduction gear. Two will be used in each of the new twin-screw towboats designed especially for coal towing service on the Ohio and Monongahela Rivers. Equipped with attached reverse and reduction gear, with a ratio of 3.034-to-1, the engines are said to provide a great safety factor while maneuvering at river locks and docks. This drive enables the engines to continue running in the same direction while the towboat is going ahead or astern.

The two new towboats are of identical dimensions. They measure 108 feet in length and have a 26½-foot beam. This length is two-thirds as long as the conventional sternwheel steamboats, and this will provide added maneuverability. When operating on the Ohio River, the boats are able to tow approximately nine barges carrying 8,000 to 10,000 tons total. On the Monongahela they will push six barges or an average load of 5,400 tons. Both vessels are expected to be in operation early in 1951. The Superior engines shipped are the first of twelve units to be used for powering six towboats being built by Dravo. Two boats each are for Pittsburgh Consolidation Coal Company and Jones and Laughlin Steel Corporation, and one each is for Crucible Steel Company of America and the Island Creek Fuel and Transportation Co., Huntington, W. Va.

### General Motors Appointment



The appointment of Robert W. Phillips as assistant to the Marine sales manager of the Detroit Diesel Engine Division of General Motors has been announced by V. C. Genn, general sales manager of the Division. Phillips comes to Detroit Diesel

from the Maritime Commission, where he was assistant chief construction supervisor on the new superliner *United States*. He has also held executive sales and engineering positions in several maritime organizations and shipbuilding corporations. In his new capacity, Phillips will be assistant to W. C. Gould, Marine sales manager.

### New York Central Railroad Orders New Diesels

The New York Central Railroad announced recently that it had placed orders for 200 diesel-electric locomotive units costing approximately \$31,000,000. This is the largest locomotive order ever placed by the Central. The order for these diesels is made up of 130 road switchers, 46 road freight units, 20 yard switchers and 4 road passenger units. With the addition of these new units the total of diesel-electric locomotives on the New York Central and its affiliated railroads will be increased to 1,255 units with a total of 1,491,100 hp. Deliveries on the new order are expected to begin early in 1951 and to be completed during the third quarter of the year.

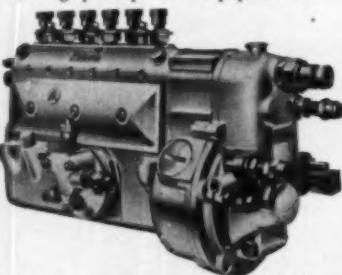
The locomotives will be constructed by the Electro-Motive Division of General Motors Corp.; the American Locomotive Co.; Fairbanks, Morse & Co.; and Lima-Hamilton Corp. Orders placed with each manufacturer are: Electro-Motive Division: Thirty-four 1,500-hp road freight "A" units; four 2,250-hp. road passenger "A" units; fifty 1,500-hp. road switchers; twenty 1,200-hp. yard switchers. American Locomotive Co.: two 1,600-hp. road freight "A" units; ten 1,600-hp. road freight "B" units; fifty 1,600-hp. road switchers. Fairbanks, Morse and Co.: thirteen 1,600-hp. road switchers. Lima-Hamilton Corp.: seventeen 1,200-hp. road switchers.



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### Diesels Level Hills



In the back section of the Beverly Hills district, 15 miles west of the business center of Los Angeles, is the new 800-acre Bel-Air subdivision. It is exceedingly rough, brush-covered country, one hill after another, rising 400 to 1,000 feet above the canyon floors. E. Steinkamp, Inc., with a fleet of big crawler tractors operating bulldozers and 16 to 24-yard wheel scrapers, is conducting a very spectacular housing project in this subdivision. Tops of hills are being leveled off, sides of hills terraced, ravines filled, and roads built to provide sites and approaches for numerous hillside homes. A model moderately priced home has already been built in the canyon leading to this subdivision.



Among the tractors utilized on this project are four International TD-24 crawlers shown in accompanying illustrations at work on the rough terrain. Two of the tractors are owned by Harry Hicks, sub-contractor. E. Steinkamp, Inc., is the building contractor.

### Appointment of Special Representative

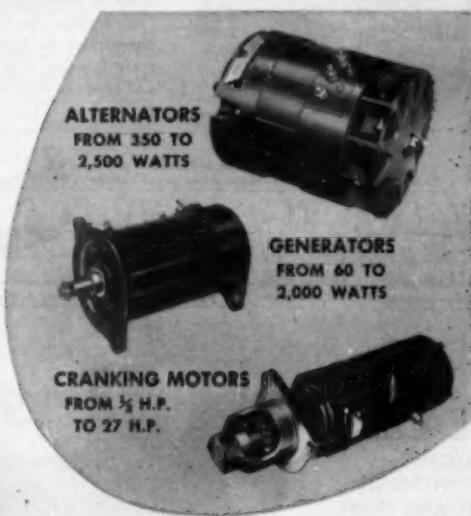


B. G. Blattner

D. G. Blattner has been named special representative in engine application for the Eastern Sales Division of Caterpillar Tractor Co., serving the states of New York, New Jersey, eastern Pennsylvania and Connecticut. Blattner was graduated from Massachusetts Institute of Technology in 1947 with a B.S.

degree in mechanical engineering and is a member of S.A.E. and Theta Xi professional fraternity. He joined Caterpillar as a college graduate trainee and has since served as laboratory engineer in the research department as special representative in the sales development division of the general sales department and as a member of the sales engineering division.

## FOR SPECIAL HEAVY-DUTY ELECTRICAL EQUIPMENT



Turn to Leece-Neville when in need of special, heavy-duty electrical equipment. For over 40 years, Leece-Neville has been the leader in designing and manufacturing generators, cranking motors, voltage regulators and switches to lick the toughest problems.

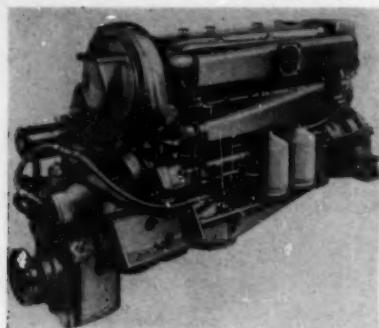
Why not let our Engineers go to work on your problem? Just write Dept. 2, The Leece-Neville Company, Cleveland 14, Ohio.



Pioneer and STILL Quality Leader...

**Leece-Neville**

### New Marine Diesel at Motorboat Show



A new, larger General Motors 2-cycle marine diesel engine, the "6-110", will be the principle feature of the Detroit Diesel Division of General Motors at the 1951 National Motorboat Show. Shown for the first time in any marine engine or boat exhibit, the 6-110 engine has met with the enthusiastic reception of Detroit Diesel's distributors. Designed to provide greater horsepower in a single unit than the familiar Series 71 2-cycle diesels, it is a 6-cylinder engine, 5 inch bore by 5.6 inches stroke, containing many of the design principles of the popular Series 71 engines. Like the "71" engines, the 6-110 affords power on every downstroke. It features unit injectors—one for every cylinder. The engine is blower scavenged and is of the centrifugal type mounted above the

flywheel. The rated bhp. for pleasure craft at 1800 rpm. is 275, for work boats, at 1600 rpm., is 240. Shaft horsepower for the same speeds is 10 hp. less. The most conservative rating in "continuous heavy duty" operation for work boats is 175 shaft hp. at 1450 rpm. Detroit Diesel plans to have a "cut-away" model of the engine on exhibit.



Another feature of the exhibit will be a transparent plastic, motor-driven model of the Allison "Torqmatic" torque converter which will demonstrate the operating principles of the torque-converter which is a component part of Detroit Diesel's engine-torque converter units. Colored balls suspended in the fluid will enable visitors to actually see how power is transmitted.

### Centrifugal Separators



A complete line of separators for cleaning compressed air by means of centrifugal force is announced by the Swartwout Company of Cleveland, Ohio. Known as the Swartwout Airfuge, the separator is available in seven inlet and outlet tapping sizes, from  $\frac{1}{2}$  inch to  $2\frac{1}{2}$  inches. According to the manufacturer, the Swartwout Airfuge removes 99 per cent or more

of all impurities from compressed air without pressure drop. Moisture, oil, scale and other solids in the air are whirled outward to the walls of the unit, where they drain down to the trap section. At the same time the clean, dry air passes unimpeded to feed line or tool, operating the equipment without danger of corrosion, wear, clogging, fire, explosion or freezing which occur with contaminated air. A float-operated trap automatically releases accumulated liquids as they rise to a level above that necessary to effect a seal. Drain valve outlet is tapered to prevent stoppage by particles of scale, etc. Information on the complete Swartwout Airfuge line may be obtained by writing for Bulletin S-13 to The Swartwout Company, 18511 Euclid Avenue, Cleveland 12, Ohio.

### Branch Manager Appointed

Announcement has been made of the appointment of Ralph S. Lorimer as Branch Manager of the National Supply Company's new Washington, D.C. office. Mr. Lorimer brings to National Supply a background in diesel engineering which dates back to 1917, the year he joined the Atlas Imperial Diesel Engine Company of which his father was one of the founders. He has been engaged in almost every phase of diesel engine manufacturing, including development work, field engineering, production, sales, and was, immediately prior to joining National Supply, in charge of the Lorimer Diesel Engine Company of the Atlas Imperial organization.

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AT SEA LEVEL,  
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## More Diesels for Missouri Pacific

The largest order for diesel locomotives ever made by Missouri Pacific Lines has been placed for 124 units, costing more than \$17 million. These new locomotives will make it possible for the railroad to complete its dieselization program on three more divisions: Kansas City Terminal, Kansas City-Omaha and Kansas City-Joplin Lines. On its Texas Lines, the International-Great Northern will be completely dieselized south of Kingsville, Texas. Delivery of the new diesel locomotives will start in the Spring of this year and it is anticipated that all new equipment will be in service by the summer of 1951. Two-thirds of Missouri Pacific's traffic will be handled by diesels after the delivery is completed.

## A New Switch Unit



To meet the need among users of diesel standby generators for an efficient switching mechanism to transfer load to the standby generator when the normal power source fails, G. & W. Electric Specialty Co., Chicago, Illinois, has designed the unit shown above. The complete unit consists of a 7,500-volt, 3-pole, 400-ampere load-break oil switch and an automatic operating mechanism mounted on a frame of welded structural steel. Control transformers are mounted in the oil switch tank, and all control wiring is completed at the factory. Only three connections—load, normal feeder, and standby generator—are required before putting the unit into operation.

When the voltage of the normal power source drops to 65 per cent of normal, a control switch is actuated to start the diesel generator. A time delay relay in the control circuit allows the diesel generator to build up to full voltage before the switch operates to transfer the load. The operating mechanism will automatically return the load to the normal power source and stop the diesel standby generator when the normal power source is re-energized. For further information write DIESEL PROGRAM, File 72, P. O. Box 8458, Los Angeles 46, California.

## Manager of Service Named at G-E



Allan L. Davis

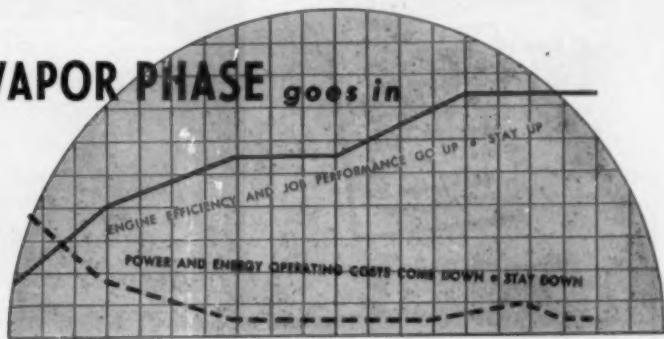
Allan L. Davis has been appointed manager of service of the transportation divisions of General Electric's Apparatus Department in Schenectady, N. Y., according to an announcement by H. W. Gouldthorpe, manager of the transportation divisions. The position is newly-created and will be one of evaluating and analyzing service requirements for the transportation industry. Pioneer

work in service practices will also be undertaken. Mr. Davis was born near Sweetwater, Texas. After attending western colleges, he was employed in heavy construction work in the mill, mining, and railroad industries. In 1930 he joined the Los Angeles Street Railway Company, where he later became superintendent of car maintenance. He wrote several accounting and maintenance procedure manuals for the railway, and was active in the development of the PCC car. In 1945 he joined the General Electric Company as service engineer of the Los Angeles office. He was later made transportation engineer. He moved to Schenectady in May, 1947, and was appointed manager of the ALCO-G-E Service Engineering Division, a post he has held until his recent appointment.

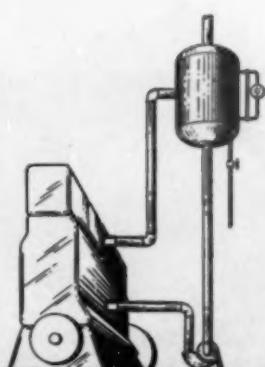
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Vapor Phase reduces engine operating costs to a new low—provides record engine efficiency unaffected by ambient temperatures or conditions—doubles and trebles engine life.

—Permits use of low-cost engine fuels, even untreated acid fuels, without harmful effect.

—Eliminates need for expensive boilers, heaters, heat exchangers, troublesome fans, belts, radiators or costly cooling towers, upon which your requirements may now depend.

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Vapor Phase equipped engines also serve the multi-purpose job of generating steam, heating water, fluids, space or other process (including cooling or heating through air conditioning systems)—each as required or all at the same time, for the cost of engine operation only. Imagine the saving!



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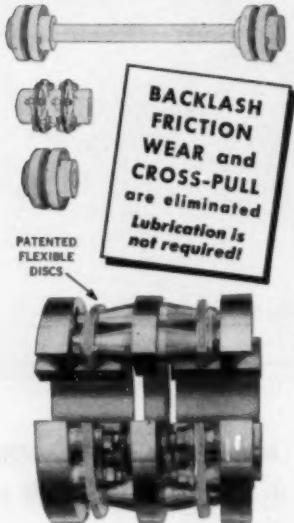
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**Patented Flexible Disc Rings** of special steel transmit the power and provide for misalignment and end float.

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COMPRESSOR DRIVES, MARINE MAIN  
DRIVES, LOCOMOTIVE MAIN DRIVES,  
AUXILIARY DRIVES, ETC.

Write for the latest reprint  
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**THOMAS FLEXIBLE COUPLING CO.**  
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## MOBILE SCHOOL FOR PERKINS DIESEL INSTRUCTION

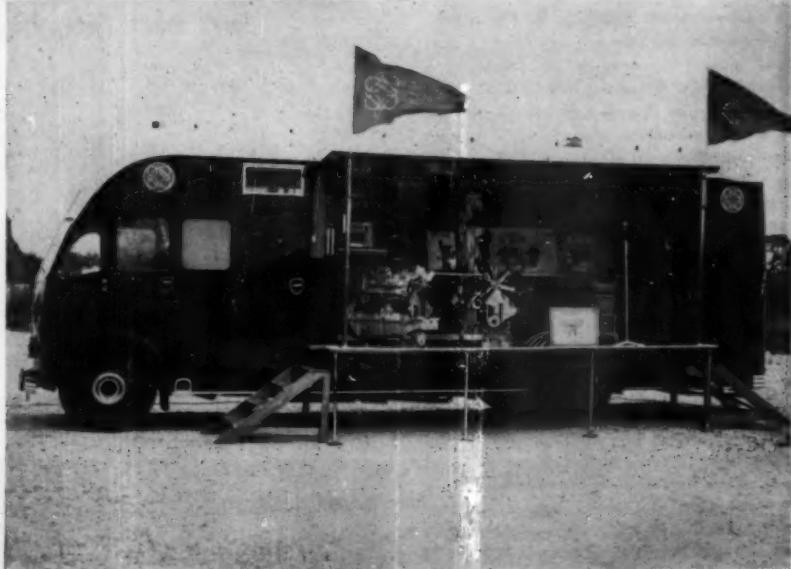
A MOBILE school which can cope with an audience of several hundred and is, moreover, especially adapted for use abroad, thus facilitating export service, has just been produced by F. Perkins Ltd., of Peterborough, manufacturers of the Perkins P-6 diesel engine. This is the first of five, and is to be sent to Canada, where it will be used to educate Canadian mechanics in the essentials of diesel engine running, maintenance, and service. Others are to be sent to Australia, Africa and India. The fifth will be kept and used in England.

The basis of the mobile school is a Seddon passenger chassis, lengthened by 2 feet. The superstructure was built in the body-shop of Seddon Motors Ltd., and is a fine example of the coach-builders' art. The near side of the body opens to

form a platform and canopy. Two sectionalized Perkins engines, a P-6 "T.A." (tractor) and a P-6 V (vehicle) are pivotally mounted on the main floor and capable of being swung outward to take up convenient and accessible positions on the extended leaf, where they are locked in that position. Stairs are set up at each end of this platform so that it is thus possible to enter the vehicle without using either front or rear doors of mobile school.

Chief interest, however, lies in the equipment of the vehicle, which is most comprehensive and we believe unique. Most outstanding item is probably the combined ratio, recording and autochange gramophone set, located on the rear near side. It is coupled to loud speakers one at each end of the vehicle, which have a range of 200 yards.

The recording apparatus utilizes a narrow paper strip, long enough to give a 35-minute repeat. One of its purposes is to allow messages from the directors of F. Perkins Ltd., in Peterborough, to be dispatched by air mail and broadcast from the school in the language of the territory concerned. Mounted in glass cases inside the workshop at the front end are (a) the essential tools; (b) a set of Perkins genuine spare parts. Atomizer testing equipment and sectionalized injection equipment are included in the exhibits. At the bench at the rear end of the body is a single cylinder diesel engine driving a 3 kw. generator. This provides current for a set of 110-volt storage batteries capable of supplying all lighting and electrical needs for 11 hours without recharging. The main set utilizes fluorescent tubes and these take current from the mains; the mains can be switched off at night, a supplementary set of lights is available, the current for which is taken off the 12-volt vehicle battery. The vehicle is heated and insulated against heat or cold.



## Vice President of Mack Trucks



A. R. Kelso

A. R. Kelso has been elected vice president of Mack Trucks, Inc., it was announced recently by E. D. Bransome, chairman and president. At the same time Mr. Kelso was named vice president and a director of Mack Manufacturing Corp., the parent company's wholly-owned manufacturing subsidiary. In

his new position Mr. Kelso will be in charge of manufacturing and production at all Mack plants. He will make his headquarters at Allentown, Pa., site of the 50-year-old company's main assembly plant. Mr. Kelso joined Mack early this year as production counsellor. During World War II he was assistant general manager of the U. S. Cartridge Co., St. Louis, Mo., a government-owned facility operated by the Western Cartridge Company Division of Olin Industries, Inc. Previously in his long connection with the automotive industry Mr. Kelso has been associated with Hudson Motor Car Co., Continental Motors Corp., and Motor Products Corp.

## New Sealing Compound



A new sealing compound for threaded joints and gasket surfaces known as Leak Lock has been introduced by the Highside Chemicals Company. Leak Lock sets up approximately three times faster than other joint sealing compounds that do not become hard or brittle. This prevents liquids and gases from pushing through the compound before it has set up. Leak Lock remains plastic enough to permit easy disassembly. Instead of a porous dough-like substance, Leak Lock forms an elastic, rubbery film that will flex with vibrations and retain a smooth, non-porous skin. Due to the remarkable resistance of the poly-hydroxylated plastic to mechanical stress and chemical breakdown, Leak Lock is being applied in many fields. Leak Lock resists a wide range of chemicals and solvents, including aromatic and chlorinated solvents, gasoline, including 100 octane, oil, "Freons," methyl chloride, sulphur dioxide, carbon tetrachloride, butane, propane, benzene and others. The dielectric properties of Leak Lock enable it to be used as a sealer and insulator. Leak Lock is available in non-clogging tubes and in cans. Complete information can be obtained by writing DIESEL PROGRESS, File 74, P. O. Box 8458, Los Angeles 46, California.

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#### A.C. GENERATOR — WESTINGHOUSE

- Voltage — 440 volts — 3 phase
- Power Factor — 80%
- Frequency — 60 cycles
- Speed — 1200 r.p.m.
- Duty — Continuous
- Excitation — D.C. exciter
- Degree of enclosure — Open — dust-proof
- Method of cooling — Self ventilated

#### D.C. EXCITER — WESTINGHOUSE

- Voltage — 120 volts
- Amperes — 333

#### ENGINE — G.M. 8-268A — 8 CYLINDERS

- Nominal H.P.—450 • Air starting
- Bore—6½" • Stroks 7"
- Speed—1200 r.p.m. • Cooling—heat exchanger

WEIGHT OF GENERATOR SET — 16,705 LBS.

WRITE — PHONE — WIRE MARINE DEPARTMENT

## The BOSTON METALS Co.

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### First Supercharged Dual-Fuel Engines to Burn Sewage Sludge Gas in East

The first supercharged, dual-fuel engines that will operate on sewage sludge gas in the east are now being installed in Bay Park, Long Island. They are part of a \$7,500,000 new Nassau County Sewage System, which will serve 53 per cent of the county area and 85 per cent of the population.

### 150% More Stretch



The Chemical Department of the General Electric Company at Pittsfield, Mass., has developed a new silicone rubber compound. This G-E silicone rubber compound 81223 is the most recent development of the laboratory. It has been formulated specifically for those applications requiring a heat resistant rubber-like material possessing greater elongation and hot tear resistance than former stocks. The elongation of the new product is from 100% to 150% greater than former compounds and features ease of fabrication and low gravity. Further data is available from the nearest G-E sales office or from the General Electric Company, Chemical Dept., Waterford, N. Y.

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Unit Capacities  
10 to 1875 Kva  
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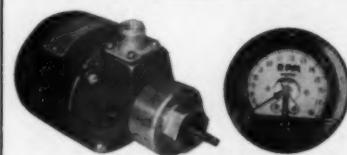
Write or wire today for bulletins and complete information regarding these fine, fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S. F.), California, and Jersey City, N. J., and see units in operation on our test stand.

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A quality precision torque meter engineered to your specifications with scales calibrated to your requirements. Elimination of wear parts assures sustained accuracy, non-directional or indicating forward and reverse.

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DIESEL PROGRESS

## New Appointment



Harry L. Emerson

Harry L. Emerson has been appointed vice president in charge of manufacturing of the Rockford Clutch Division of the Borg-Warner Corp. He will also continue as works manager, a position he has occupied for eight years.

## The Dye Penetrant Method

You may remember the article we ran in the September issue on pages 60 and 61 in which we described the Dy-Chek Method of Inspection. This article aroused so much interest that we placed in the hands of the manufacturer five times more inquiries from you, our readers, than we have ever received from any other similar article. In response to this great interest, the manufacturers are issuing a series of bulletins outlining the uses and application of this Dye Penetrant Method for the quick detection of surface flaws. The DPM, for short, employs three easy to handle chemicals. A penetrant liquid of unusually high capillary attraction and correspondingly low surface tension—colored a brilliant red; a volatile solvent which removes the penetrant from the metal's surfaces; and a white developer which is a multi-purpose quick drying solution. The latter provides a white background against which the brilliant scarlet color of the penetrant shows up with photographic intensity and at the same time it draws or "bleeds" out the penetrant from whatever flaws it has penetrated. The dye penetrant, a super-saturated solution, will find its way even into unseen, hair thin flaws and work through these from one subsurface abnormality to another. This method of flaw detection was developed by Northrop Aircraft chemists and engineers, among them Rebecca H. Smith, chief metallurgist of the Turbodyne Corp., a Northrop subsidiary. Copies of the bulletin can be obtained by writing Mr. James A. Greer, Dy-Chek Company, 1515 East Broadway, Hawthorne, Calif.

## Combination Cleaner and Flusher

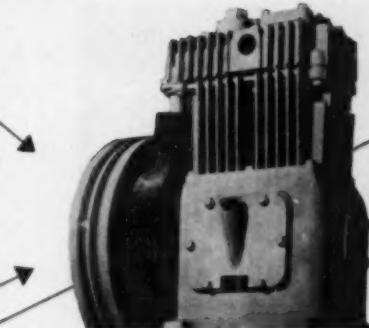
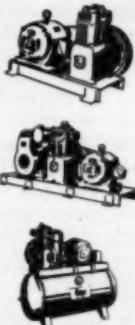


A combination oil-fired, electric-motor-driven steam cleaner and a cleaner that reverse flushes complete cooling systems is announced by the Homestead Valve

Manufacturing Company. Known as the Model JO Hypersure Jenny with built-in Steam Thoropurge, it operates at 80 to 120 pounds pressure and 90 gallons per hour water capacity for extra-heavy duty removal of dirt and grease. As a cooling system cleaner, it employs heat, chemical, sudden but safe temperature changes, and a strong air blast. According to the manufacturer its cost is lower than separate steam cleaners and cooling system flushers. For catalog and specification sheet, write Hypersure Jenny Division, Homestead Valve Mfg. Co., P. O. Box 843, Coraopolis, Pa.

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Quincy Compressors not only look good as a part of a Diesel installation, they have an established reputation for dependability. Special design features for greater dependability and durability include — Timken bearings — Lynite rods — perfectly balanced crankshaft — copperlined intercooler — automatic and positive lubrication. Quincy Compressors are available in a wide variety of sizes ranging from 1 to 90 c.f.m. Depend on a Quincy specialist to help you select the correct type and size compressor to meet your requirements. Write Dept. K-16 for details and prices.

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Manufacturers of Air Compressors Exclusively

Here's Why  
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INSTALLATIONS  
COST LESS

WITH  
**Bendix STARTER DRIVES**

CHECK AND COMPARE  
THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no mounting linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.



Yes, it costs less to install a Bendix® Starter Drive, but that's only part of the story. The outstanding efficiency of the Bendix Drive has been performance proven in over 85,000,000 installations. No other starter drive approaches this record. Whatever your type of diesel, or whatever its purpose, for more dependable all-around performance it pays to specify Bendix Starter Drive.

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Lister Diesel Engine, with clutch, 38 HP  
 Excellent Condition \$1,200  
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**THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP**

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## West Coast Diesel News

By FRED M. BURT

TO GODFREY Drilling Co., Long Beach, Calif., a 35-hp. P. & H. diesel to power a pump on a rotary water well drilling unit.

VETERAN TUNA clipper *Northwestern* was recently repowered with a new Model V6, 600-hp. Union diesel at Long Beach Marine Repair yard, Long Beach. Union Diesel's 24 hour per day, 365 days per year, service from factory has been extended to San Diego, with exclusive service engineer Kris Vestergaard available with Union parts and service at all times.

FOR PART time stand-by use, three 1,600 General Motors diesels driving generators for processing power at the Pennsylvania Salt Mfg. Co., plant, Portland, Ore., are using a new Engineering Controls Vapor Phase system, without condenser, as a cooling unit. When put into more constant operation, steam for heating will be produced by Vapor Phase.

REFRIGERADORA de Salina Cruz, S.A., owner-general manager Roberto Avendano, has extended shrimp fishery to northern Guatemala with new freezing plant, and fleet of trawlers operating out of Salina Cruz, Oaxa. Eight of the 15 trawlers already built, seven to be constructed, all powered with 120-hp. Caterpillar diesels.

PURCHASED by Geo. R. Beggs, Bakersfield, for his Empire Transportation Co., two new Mack petroleum tanker trucks, powered with 200-hp. Cummins diesel engines.

THIRTEEN 2,500-hp. Model GMW direct-connected Cooper-Bessemer gas compressor units will be used on the P. G. & E. natural gas pipeline from New Mexico to San Francisco—six at the Topock, Calif., compressor station, and seven at Hinkley.

THE NEW 87-foot fan tail tuna clipper *Conqueror*, built by Tacoma Boat Building Co. for John Rippo & Associates, San Diego, is powered by two 6-cyl Model 1197, 190-hp. Pacific diesels supplied by J. T. Siler Co., Wilmington, Calif.

## CRANKSHAFT GRINDING SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 15½" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts.

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 Prompt Service... Accurate Work

Established 1924... 26 years experience  
 grinding crankshafts! The most complete  
 engine rebuilding shop in the Southwest!

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 DALLAS 1, TEXAS

IN THE yard of Tomas de Rueda, Jr., Mazatlan, Mexico, one of the largest of shrimp trawler building operations now underway will include early production of 20 trawlers, 40-foot to 65-foot, most of which will be Caterpillar diesel driven.

AT THE Paloma, Calif., recycling plant of Western Gulf Oil Co., eight 880-hp. Clark natural gas engines direct-connected to compressor cylinders, have recently been added to supplement previously installed 12 Clark engines totalling 6,900-hp., compressing gas to 4,500 psi.

THE BIG sistership, 118 foot tuna clippers are under construction at J. M. Martinac Shipbuilding Corp. Tacoma; two to be powered with 600-hp. Superior diesels, with twin G.M. Model 3-268-A diesel auxiliaries driving 100-kw. generators, for Joe Correia and Associates and Andrew Morthlad and associates; the third one for Capt. Manuel Silva and sons, is the same except to have 600-hp. Enterprise diesel for main power.

UNDER CONSTRUCTION by Prothero Boat Co., Seattle, a new 61 foot tug for Pope and Talbot Lumber Co., Port Gamble, to be powered with a new 260-hp. Washington diesel.

THE NEWEST addition to the Long Beach harbor-based fleet of Pacific Towboat & Salvage Co. is the 100 foot *Pacific Atom* powered with a 900-hp. General Motors diesel engine, with Sperry electric steering.

THE FORMER regional headquarters of Superior Diesel Engine Div. of National Supply Co. formerly in Torrance, have been consolidated with the activities of the Atlas Imperial Diesel Engine Div. at 1048 So. Seaside Ave., Terminal Island, with J. A. Flynn, Gen. Mgr., and W. M. Griffith, Sales Engineer. Besides full parts and service availability, the 20 man staff includes the Superior oil field and marine service men.

THE FISHING boat *Vittoria*, Capt. John Vanekich, fishing for West Coast Fishing Co., Wilmington, has just received a new Atlas Imperial, 365-hp. marine diesel and Western 2:1 reduction and reverse gears, replacing a 240-hp. Atlas; installation at yard of Atlas Imperial Diesel Engine Co. Terminal Island.

### BARGAIN FOR QUICK SALE



**G.M. 12-567 DIESEL**  
 Completely Rebuilt

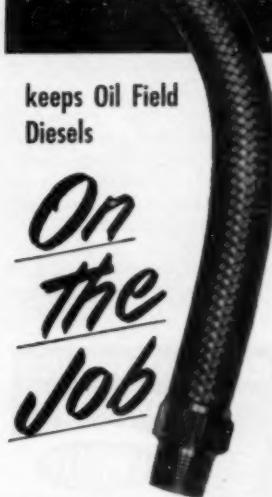
900 horsepower

Equipped with Falk Reduction Gear; Muffler; Lube Oil Filter; Gauge Panel; Centrifuge; Air Compressor; and controls for pneumatic clutch.

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Diesel mechanical-drive rotary rigs for deep oil well drilling represent a considerable capital expenditure; therefore they must be kept operating constantly with minimum shutdown time for repairs. When TITEFLEX Flexible tubing is used for diesel water lines, fuel lines, and exhaust lines, maintenance becomes negligible. The all-metal construction of TITEFLEX tubing assures reliable performance for many years.

Throughout industry, TITEFLEX all-metal flexible tubing is helping to keep expensive machinery and equipment "on the job". TITEFLEX tubing is available with innercore made of one of five different metals: brass, bronze, monel, inconel, and stainless steel. One of these metals will be exactly suited to your requirements. Write for Catalog No. 113 for complete information.

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Exclusive Manufacturers of Titeflex high quality products for more than 30 years

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FOUR new tuna clippers under construction by National Steel & Shipbldg. Co., San Diego will all be powered with 800-hp. 8-cyl., supercharged Enterprise diesels with two 133 Murphy diesel-electric generating sets for auxiliary power; two 133 foot wood vessels for M. O. Medina; two steel clippers, 121 foot long vessel for French Sardine Co., 127 foot ship for Andrea Castagnola and Sons.

THE Vivian Engine Works, Ltd., Vancouver, B. C. diesel engine builders has been purchased by the Brush Electrical Eng'g. Co., Ltd., England, whose subsidiaries include Associated British Oil Engines Group (Aboe) manufacturing Mirrlees, Meadows, McLaren, National and Petter engines marketed in 88 countries.

THE PACIFIC Electric Rwy. Co., in Los Angeles is spending \$50,000 in 1951 to install "super Combustion" devices on 312 gasoline-burning buses to consume excess smoke and fumes. The company's 268 diesel buses are not affected as they operate virtually smokeless when properly handled.

ED HARRISON with long experience as a diesel engine specialist, has been moved from Engineering to Engine Sales at Gunderson Bros., Engineering Corp., Portland, Ore., distributors of GM-Detroit diesels.

FAN TAIL Albacore 46 foot boat "Husey," San Diego, built by August Nordlund, Terminal Island powered by 125-hp. Pacific Diesel; *Unione II*, 60 foot tuna boat built by Rask Boat Bldg. Co., Coronado, Calif. with a 190-hp. Pacific diesel.

THOMAS MACHINE Wks. Co., San Francisco, one of the oldest marine engine and repair firms in Northern California, was recently appointed Northern California distributor for Nordberg marine engines; Angelo Benedetti president will continue in charge of shop and service facilities; Bill Marchington who has been for 15 years in sales and engineering for Enterprise Engine & Fdry. Co. is the new vice president.

WITH THE opening of new open pit mining operations at the Phelps-Dodge copper mine at Bisbee, Arizona, 12 new Mack dump trucks powered with 300-hp. super-charged Cummins diesels, have been purchased.

THE 55 foot *Madrona*, owned by Olson Tug Co., Tacoma, has been re-powered with a new 240-hp. Buda diesel with 2:1 Western reverse and reduction gears.

UNDER construction at Tacoma Boatbldg. Co. yard the following tuna clippers - 121 foot vessel for O. W. Martin and Associates with 12-cyl., 1200-hp. G.M. diesel; twin Superior auxiliaries; and 120 foot *Saratoga* for Capt. Eddie Madruga, with 800-hp. Enterprise for main power, two Series 110 General Motors diesels for auxiliaries. The *Countess* and *Cape San Vincent* were previously reported.

FOR HOPPER Machine Co., Bakersfield, Calif., three 4-cyl. 28-hp., 1800-rpm. Waukesha diesels for powering compressors used with air tongs on oil well drilling equipment.

... and now please turn to page 86...

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*metal inspection*

Simplified  
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## EASTERN WASHINGTON DIESEL TRUCKS



**M**R. L. I. UPTEGROVE, who recently assumed control of Eastern Washington Transports, Inc., and is president and general manager, is replacing the old fleet of tank trucks with new, big diesel W-4064-L Western Internationals. The concern delivers gasoline, stove oil, and diesel fuel oil from a bulk plant in Seattle to various distributor bulk plants within a radius of 350 miles all over the state of Washington. The concern now operates three of these new W-4064-L's and has three more on order. Each truck is traveling from 9,500 to 10,000 miles a month.

One of these new W-4064-L Internationals with 6-wheel Clough trailer and new Comfo-Vision cab is shown in accompanying illustrations. The tank on the trailer has a capacity of 4,300 gallons (plus expansion) and that on the truck of 3,100 gallons. The overall length of truck and trailer is 60 feet. All wheels except the two in front of truck are duals, are of aluminum, and are provided with 10:00-20 Goodrich tires. The truck has a wheelbase of 227 inches and a maximum gross vehicle weight of 36,000 pounds. The engine is a Cummins Model NHB 600 with a certified horsepower of 200 at 2,100 rpm. This is a 4-cycle, 6-cylinder, bore 5 1/8-inch, stroke 6-inch, standard truck engine, thousands of which are in daily use up and down the Pacific Coast and over into the Mountain states. Eastern Washington Transports, Inc., was founded in 1927 and its operating certificate covers the entire state of Washington. Mr. Uptegrove headquarters at 228 Spokane Avenue, Seattle. He has been in the trucking business since 1925.

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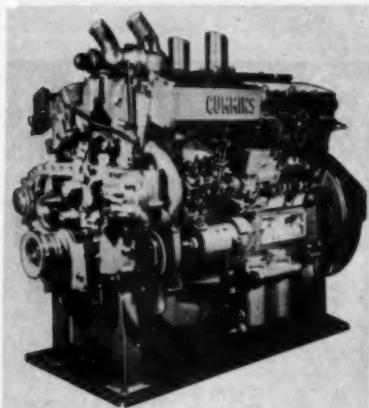
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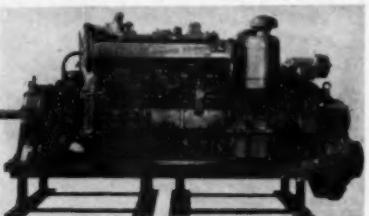
JENKINTOWN 7, PENNSYLVANIA

### Displayed at Motor Boat Show

Three high-horsepower, lightweight, highspeed diesel engines, including the new JS-600 Cummins diesel, will be displayed in the booth of Cummins Engine Company, Inc., Columbus, Indiana, at the 1951 National Motor Boat Show in Grand Central Palace, New York City, January 12-20. An activated, cutaway version of the JS-600 Cummins diesel will give boat owners an opportunity to study the mechanical features of the new four-cycle, full diesel, six-cylinder, supercharged engine with a maximum rating of 150 hp. turning at 2500 rpm. The activated, cutaway version of the NVHS-1200 cummins diesel also will be shown. This V-type engine has a maximum rating of 550 hp. turning at 2100 rpm. It also is a four-cycle, full diesel, supercharged engine and has 12 cylinders.



These cutaway versions have been sectionalized to show the internal structure and operation of the following units: the exclusive Cummins fuel system, including the new DD "double disc" type fuel pump; cylinders and liners; valves; pistons; supercharger and supercharger drive; gear train; water pump; oil cooler; lubricating oil pump; oil pan; crankshaft; camshaft and the four-cycle principle of operation. All sectionalized portions of the engines have been replaced with Lucite, and the engines are internally lighted and activated.



The other Cummins diesel in the exhibit will be the NVHMR-1200, an unsupercharged marine model corresponding to the supercharged, powerful 550 hp. model NVHS-1200 cutaway version. The unsupercharged NVHMR-1200 has a rating of 264 hp. at 1800 rpm. in continuous heavy-duty service and a maximum rating of 400 hp. at 2100 rpm. This V-type four-cycle, full diesel, twelve-cylinder engine will be equipped with a 3:1 "Capitol marine reverse and reduction gear; Fawick front power take-off clutch; complete base mounting rails; Ross CP heat exchanger; and Marine Products sea water pump.

DIESEL  
ENGINE  
CATALOG  
VOLUME FIFTEEN

FIRST  
PRINTING  
SEPT. 1950

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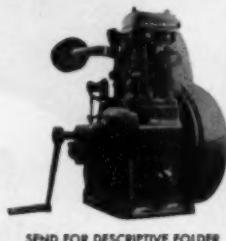
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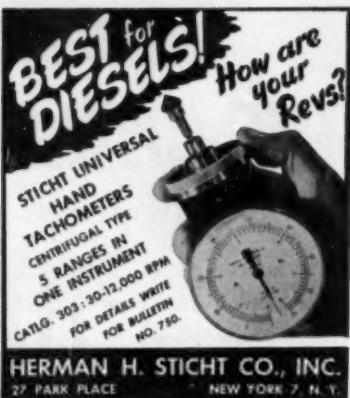
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### West Coast News

...Continued from page 83...

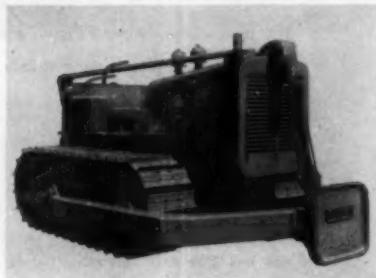
FOR Consolidated-Western Steel Co., Los Angeles, a 53-hp. "Caterpillar" diesel from Shepherd Tractor & Equip. Co., for conversion of an American hoist used on construction work, steam to diesel.

FIRST installations of their kind made in British Columbia — P & H, 3-cyl. 68-hp. diesel in towing and fishing vessel *Gold Seal I*, Gold Seal Towing Co., Vancouver; P & H 6-cyl. 138-hp. diesel in tug *River Chief* operated on Fraser River by Harbor Towing Co.

THREE MORE 120-hp. Caterpillar marine diesels for A.S.R.O., S.A. ship builders of Santa Rosalia, Mexico, from Shepherd Diesel Marine, Inc., San Diego, brings the total to five such units, for powering five steel-hulled 58 ft. shrimp trawlers.

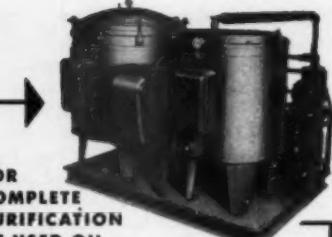
NEW ADDITIONS to the staff of Crofton Diesel Engine Co., General Motors diesel engine distributor in Southern Calif. are Louis B. Truhar, formerly with Evans Engine & Equipment Co., Seattle and West Coast Engine & Equipment Co., Berkeley, who will work out of the San Diego office; Donald I. Coney from the service division of General Motors-Detroit Diesel Engine Division, will work out of the San Pedro office.

### New HD-19 Pusher



A new pusher for use with the Allis-Chalmers HD-19 tractor has been announced by The Baker Manufacturing Company, Springfield, Illinois. Available as a complete unit or as an attachment, the new Baker pusher weighs approximately 725 pounds complete, is heavily reinforced, sturdy constructed and designed to work with practically all types of scraper push plates. The new pusher floats with the pusher block of the scraper, whether it be high on a fill or low in a deep cut.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 85.



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Eleven hours after a Southern Pacific freight and an empty passenger train crashed head-on near San Antonio, Texas, a fleet of Allis-Chalmers bulldozers helped lay enough new track to restore almost normal service. The wreck occurred early in October on the Southern Pacific's main line to California, about five miles southwest of San Antonio. The passenger train, which consisted of empty coaches being taken to Lackland Air Base to make up a troop train, had stopped on the right-of-way near Kelly Field. Suddenly, a fast 60-car freight train drawn by a diesel engine and two auxiliary units came into view. Unable to stop, the diesel engine crashed head-on into the steam engine of the halted troop train, ripping up almost 300 feet of track and creating a tangled mess of steel. Several cars were derailed and came to rest askew of the tracks. Damage was estimated to be several hundred thousand dollars and service was completely disrupted.

Shortly after the accident the H. W. Lewis Equipment Company dispatched a fleet of tractors and bulldozers to the scene of the crash in response to an emergency request from Southern Pacific's divisional engineer at San Antonio. Within an hour an Allis-Chalmers HD-10 was moving dirt in an effort to hurriedly construct a bypass around the wreck. Two hours later more Allis-Chalmers HD-19 bulldozers arrived and by 6:15 p.m. (the wreck occurred about 1:45 p.m.) the bulldozers had the "shoo-fly" partially completed. At 1:00 a.m. the following morning trains were again rolling around the wreck and operations were practically back to normal. The "shoo-fly" was approximately 300 feet long and carried around the wrecked cars. The cut was approximately 14 feet wide at the bottom and sloped back about 3:1. The cut varied from 0 to 5 feet, the deepest portion.

#### New Cooling Towers



conditioning and refrigeration condensing units, and related applications. Type "H" towers are mass produced in 10 frame sizes with refrigeration loads ranging from 3 to 35 tons. Among the new

features offered by Binks Type "H" towers are the following: the pan is made with external bolting flanges for convenient and firm anchoring of the tower. This improvement eliminates piercing the floor of the water basin. Assembly of the tower is simplified. Newly designed corner posts bolt easily and rigidly to the pan sides. Slip-fit louvers (either redwood or galvanized steel, as desired) slide into place through machine-slotted corner posts of new design which guarantee accurate spacing and angle. The float box is an integral part of the basin, and is mounted externally for easy access to the control valve.

The spray nozzles used in Type "H" towers are the Binks Rotojets. These clog-proof brass nozzles

operate on a patented off-center inlet, whirl chamber principle. The high efficiency of these compact Type "H" towers is due, to a large extent, to the maximum fluid break-up obtained with Rotojet nozzles. Binks Bulletin 44, just off the press, describes these new Type "H" towers in detail. The engineering data included covers tower specifications, tables of dimensions and weights, tables of selection for refrigeration work, tables of pressure drops of water in pipes of various diameters, and pressure losses due to pipe fittings. Copies of Binks Bulletin 44 will be sent without charge to our readers. For full information address your requests to the Binks Manufacturing Company, Water Cooling Division, 3114-40 Carroll Avenue, Chicago 12, Illinois.

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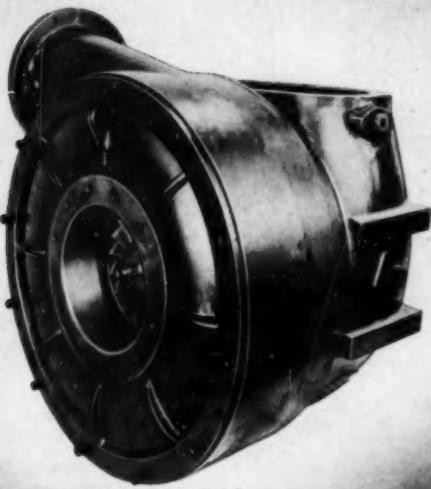
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**ADVERTISERS' INDEX**

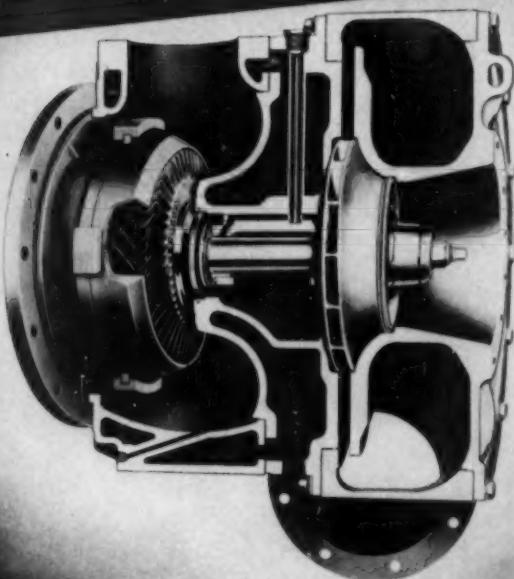
Adeco Products, Inc.	80	Lanova Corp.	86
Aerofin Corporation	61	Leece-Neville Company, The	75
American Air Filter Co., Inc.	14	Lister-Blackstone, Inc.	72
American Bosch Corporation	65	Lubaid Company	5
Binks Manufacturing Co.	71	Madison-Kipp Corp.	64
Black & White Corp.	82	Manzel, Division of Frontier Industries, Inc.	79
Boston Metals Co., The	79	Mid-Continent Petroleum Corp.	68
Brown & Sharpe Mfg. Co.	71	Murray & Tregurtha, Inc.	60
Buchi, Dr. Alfred J.	76	National Supply Co., The	25
Burgess-Manning Co.	6	National Welding & Grinding Co.	82
C.A.V. Ltd.	74	Nordberg Mfg. Co.	11
Chicago Metal Hose Corp.	70	Nugent & Co., Inc., Wm. W.	67
Cities Service Oil Co.	63	Pendleton, Larry	82
Cleveland Diesel Engine Div., General Motors Corp.	2	Petrometer Corp.	82
Columbia Electric Mfg. Co.	80	Quincy Compressor Co.	81
Cooper-Bessemer Corp.	Fourth Cover	Schoonmaker Co., A. G.	80
Crofton Diesel Engine Co., Inc.	86	Scintilla Magneto Div., Bendix Aviation Corp.	15
Detroit Diesel Engine Div., General Motors Corp.	16	Sinclair Refining Co.	82
Dy-Chek Co., Division of Northrop Aircraft, Inc.	83	Skinner Purifiers Div., Bendix Aviation Corp.	71
Eaton Manufacturing Co.	73	Standard Oil Co. of Calif.	9
Eclipse Machine Div., Bendix Aviation Corp.	81	Standard Oil Co. (Indiana)	21
Electric Machinery Mfg. Co.	4	Standard Pressed Steel Co.	84
Electro-Mechano Co., The	80	Sterling Engine Co.	58
Electro-Motive Div., General Motors Corp.	22	Stewart & Stevenson Services	26
Elliott Company	Third Cover	Sticht Co., Herman H.	86
Engineering Controls, Inc.	77	Struthers Wells Corp.	82
Enterprise Engine and Machinery Co.	28	Synchro-Start Products, Inc.	88
Erie Forge Co.	10	Texas Co., The	Second Cover-I
Fluor Corporation, Ltd., The	17	Thomas Flexible Coupling Co.	78
Fulton Sylphon Div., Robertshaw- Fulton Controls Co.	69	Tide Water Associated Oil Co.	24
General Motors Corp., Cleveland Diesel Engine Div.	2	Titeflex, Inc.	83
Detroit Diesel Engine Div.	16	Tuthill Pump Company	88
Electro-Motive Div.	22	Union Diesel Engine Co.	66
Griscom-Russell Co., The	59	United States Hoffman Machinery Corp.	86
Gulf Oil Corp.	3	Van Der Horst Corp. of America	86
Guth Company	84	Vellumoid Co., The	86
Harnischfeger Corp., P&H Diesel	19	Walworth Co.	18
Hunt-Spiller Manufacturing Corp.	20	Washington Iron Works, Inc.	87
International Harvester Co.	8	Westinghouse Electric Corp.	12-13
Koppers Company, Inc.	80	Winslow Engineering Co.	62
Kurz & Root Co.	86	Worthington Pump and Machinery Corp.	7
Young Radiator Co.	23		

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